ENGINEERING NEWS-RECORD

JANUARY 11, 1945

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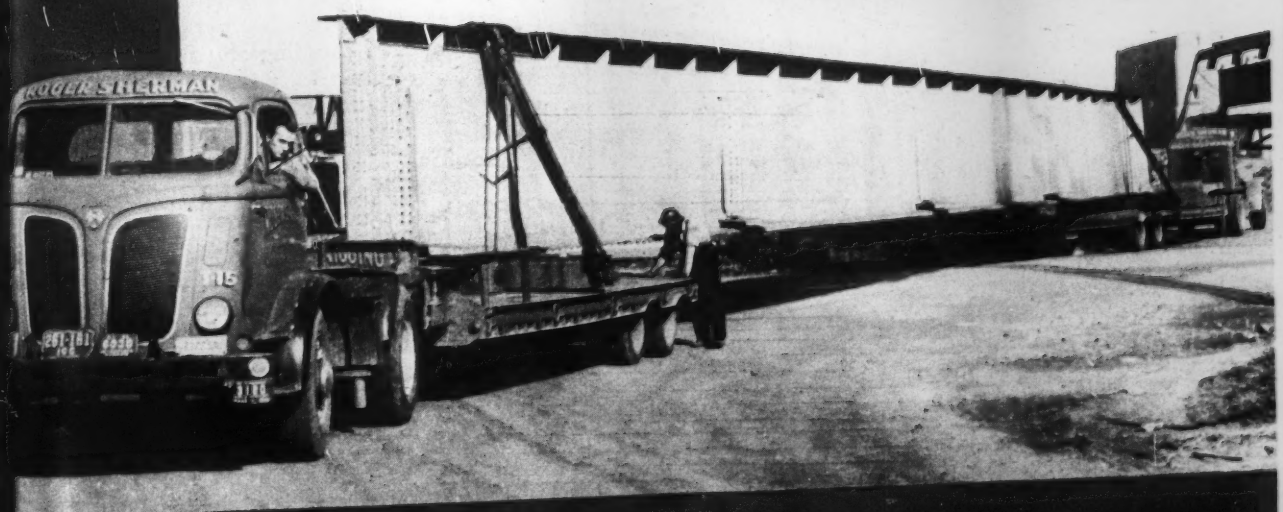
Highway Number

TRUCK SIZES AND WEIGHTS
AS THEY AFFECT
FUTURE HIGHWAY DESIGN



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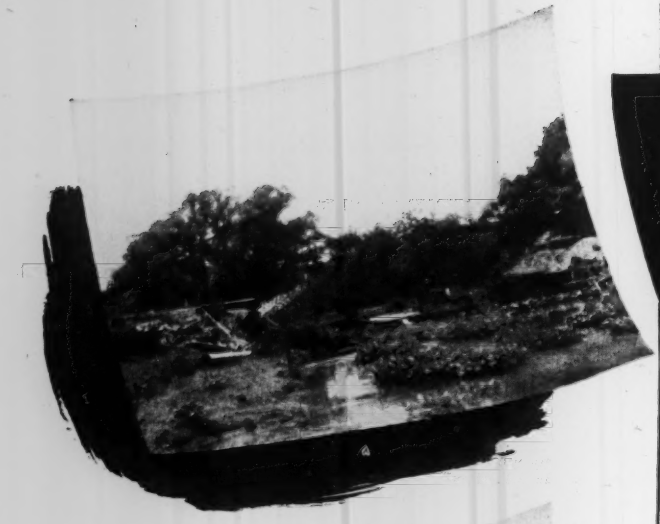
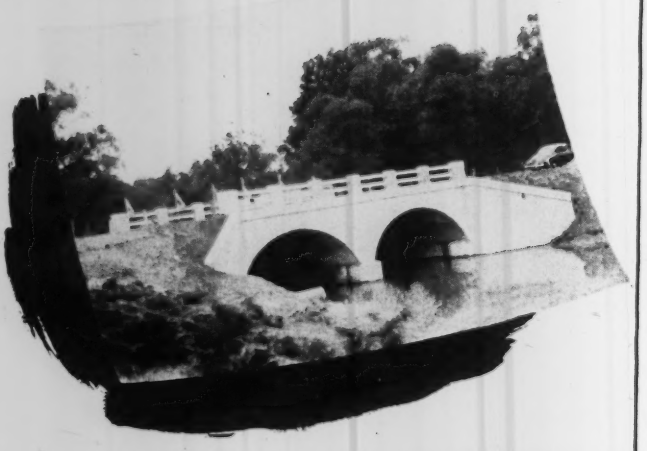
Expressway To Serve Dallas And Ft. Worth
Fully Depressed Expressways For Detroit
Road Modernization In Ohio And Georgia
Cement Treated Road Bases In Arizona





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WHAT DOES AMERICA WANT?

IT IS THE PURPOSE of this editorial, the thirty-first of a series, to state the urgent need for a clear declaration of American policy in world affairs.

Within the past few weeks there has been a wakening conviction in this country that the determination of international arrangements cannot safely be put aside until victory has been won. For we have seen actions taken in Europe seemingly without full consultation and agreement of the Allied powers, which may profoundly affect the design of the post-war world.

A declaration of American policy is needed, and it should be accompanied by a statement of our firm intention to exert full effort to procure its acceptance and furtherance. Emphatically, this does not mean that an American platform should be put forth as an ultimatum, which other nations must accept totally, or reject at the cost of having the United States withdraw from collaborative participation in world agreements and organization. On the contrary, the first plank in such an American platform should be a firm commitment on our part to participate with our associate nations in building a general system of world security and order. By definition, this requires that each participant be willing to accommodate its purely national interests to a program that can be accepted as fairly representing the interests of all. But equally, there is imposed on each participant an obligation to state honestly and openly what it conceives its individual interest to be, as well as its concept of what measures will best serve the general interest.

☆ ☆ ☆

Americans have displayed a singular diffidence in the matter of formulating a bill of American objectives — singular, in that it contrasts so sharply with our power to exercise as broad a leadership as we are able to define. This reluctance stems partly from the inherent difficulty of arriving at a coherent statement of national aims in a country like the United States — so vast in area, so multiple in its sectional and group interests, and so soundly committed to the free expression of individual thought. But it stems also, in part, from a tradition of national isolation which, however understandable in historic perspective, now stands clearly discredited by two world wars which were not of our making, but from which we were unable to hold aloof.

That the economic wellbeing and political security of the rest of the world is closely bound to the decision and performance of the United States is questioned nowhere but in America. Political boundaries and restrictions cannot build effective fences against the interplay of economic forces, and the sheer weight of American economic influence is of crucial import to all the other nations of this globe. In large measure their decisions will be shaped either in response to the opportunities that our procedures offer them, or in defense of interests that our procedures may jeopardize.

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The United States contains only about 6 percent of the world's population. But — our national income, before the war, amounted to almost 25 percent of world income; our industrial output as a whole approximates 45 percent of world totals, and we now are producing a like percentage of the world's munitions; we have 35 percent of the world's railroad mileage; 25 percent of merchant fleet tonnage; 50 percent of the world's telephones; 45 percent of steel production; 40 percent of aluminum production; 33 percent of coal output; we are refining (though part of the production comes from imports) 55 percent of the world's copper, and 70 percent of its petroleum; we now are producing 50 percent of the world's rubber (though post-war resumption of natural rubber production will sharply reduce this balance); our shares of agricultural production are, of course, much smaller, but just before the war we accounted for 35 percent of world cotton production, 15 percent of wheat, and 10 percent of wool.

Whether we like it or not, we must exercise political responsibilities commensurate with the weight of our economic power in an inter-dependent world. But before responsibilities can be assumed, they must be defined. Can the United States arrive at a clear agreement and statement of aims for which it is willing to stand sponsor?

The recent campaigns of both political parties have helped to provide an encouraging answer. In general, election mandates are glaringly deficient as indicators of a unified national purpose. A majority of voters declare themselves for the winning candidate. But even among the majority there are varying degrees of enthusiasm for the platform principles espoused by their candidate; and the substantial minorities of the defeated parties may have had no enthusiasm whatsoever for particular planks in the winning platform, or for the platform in its entirety. A sportsmanlike deference to the will of the majority is a feeble substitute for unified national conviction.

But this Presidential campaign was noteworthy for certain basic principles upon which both the platforms and the candidates of the major political parties were

united. Surely, upon such areas of agreement there may be said to have been an American mandate; the more so, because upon certain of them, we have evidence that no party or candidate could have declared opposition with any hope of victory. What then were these agreed-upon principles? The following is an attempt at a fair summary:

1. That America, in collaboration with its Allies, is committed to seeing the war through to the unconditional surrender of our declared enemies.

2. That America is committed to a responsible role in a world security system after the war, including a commitment to lend the support of our armed forces to repel aggressions that may violate such security.

3. That America is committed to the post-war goal of substantially maintaining in this country an economy that will provide jobs for those who are able and willing to work.

4. That America is committed to the principle of achieving this goal of sustained, high-level employment of manpower and economic resources under a system primarily activated by competitive enterprise.

These are American mandates. They can be made the nucleus of a coherent national policy, for they define aims upon which the great majority of our people are emphatically agreed. But no one can pretend that in this generalized form they serve as more than directional guides for either internal legislation or international negotiation. This skeleton of aims must be clothed with the living flesh of agreed-upon means. Here we have no national mandates of comparable clarity, but it is patently clear that it is our compelling task to achieve them.

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On our elected representatives in government rests the primary responsibility for formulating the specific programs required to implement national policies. Under our system of government, those representatives need continuous nourishment in the form of mandates as to what the people want. Particularly during a period when so many urgent problems are being thrashed out upon an international basis, this imposes a grave responsibility upon all sectors of our citizens; for it requires them to think in terms of the welfare of our nation as a whole, to focus upon those points which offer possibilities for substantial agreement among Americans, rather than upon matters of individual, group, or sectional advantage.

In earlier editorials I have tried to define a basis for national policy in keeping with that broad purpose. They have dealt with problems that are basic to the healthy functioning of free enterprise under the competitive system, with the mobilization of our resources for war and for reconversion to peace-time production, with labor and management responsibilities and relations, with national debt and taxation, with foreign trade and our economic relationships abroad, with the industrial development of backward areas. Since they have been presented in the McGraw-Hill publications, which reach a group broadly representative of all American industry, they have centered upon problems that have an economic rather than a strictly political import.

Future editorials, to appear during 1945, will deal with comparable subjects selected in recognition of the urgent importance for arriving at concerted definitions of national policy. I am fully aware that no individual or group can speak authoritatively for the American Nation. But I hope that an honest attempt to formulate sound concepts of national interest in crucial economic matters will help to crystallize American policy both by focusing agreement and by eliciting dissent.

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Here there is space only to indicate in broadest outline what I conceive to be desirable foundations for an economic policy for the United States:

1. The attainment of a high and sustained level of business activity and employment in the United States and in the world.

2. Active and expanding markets for world trade based upon fair competition rather than upon bloc agreements, discriminatory preferences, and cartel arrangements.

3. The encouragement of industrial development in nations that have been backward in that respect.

4. A recognition that hospitality to imports, rather than constituting a threat to national standards of living, offers in fact the most potent instrument for international bargaining that any nation can command.

5. A willingness to assume a responsible national role in international arrangements designed to provide such financial stability as may be needed to support mutually advantageous world exchange of goods and services.

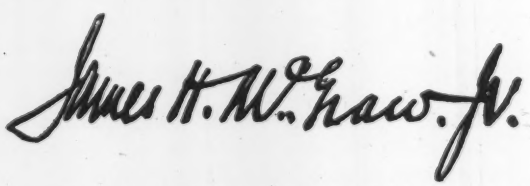
We must see to it that the end of military warfare does not merely open the door to an era of economic warfare.

The fact is that America has no choice but to assume leadership in world affairs. For the weight of our influence will be felt by other nations no less whether our attitude be positive or negative. And the cost to us of any international obligation which we might undertake must in all fairness be weighed against the equally real cost to us of dealing with measures that others may take to protect themselves against the results of our non-participation.

We have tended in the past to approach international commitments timidly, fearful that we might be outwitted in a world battle of wits. And in so doing, we have too often ceded to others the initiative of suggestion, leaving to ourselves the thankless task of accepting or rejecting what they demand of us.

Our one bargaining weakness stems from the fact that other nations, by contrast feeble in potential power, know what they want and are able to mobilize all their strength to achieve it.

America can be the most effective nation on earth—if only it knows what it wants.



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Vol. 134 JANUARY 11, 1945 No. 2

COMING NEXT

• Hearings on a proposed water treaty with Mexico relating to the Rio Grande, the Colorado and Tijuana rivers are expected to begin before the Senate Foreign Relations Committee this month. Ratification is being opposed by California on the ground that the treaty allocates too much water to Mexico. A summary of the treaty and of the arguments for and against it is to be featured in the Jan. 25 issue.

• Maintenance of concrete floors and dust control are major problems in warehouses where heavy steel-tired trucks are used. Methods of resurfacing with concrete and asphalt mastic, as well as procedure for dust control have been developed by the Repairs and Utilities Branch of the Office of the Chief of Engineers of the Army. These methods will be outlined in the Jan. 25 issue.

• Probably about 90 percent of the indeterminate structures occuring in an engineer's practice are symmetrical. Using the concept of symmetrical and anti-symmetrical loading, the analysis of monolithic structures is considerably shortened by use of graphics developed recently by D. B. Steinman, well-known consulting engineer. Several bents and closed frames are analyzed to illustrate the method in the Jan. 25 issue.

LOOKING AHEAD

• Engineering and construction performance will be under the spotlight of attention in the Feb. 8 Annual Survey and Forecast Issue. Activities in all fields of the construction industry will be analyzed in relation to past and future accomplishments. Included also is a statistical summary, and authoritative articles on urban rehabilitation, Latin American prospects, Army Engineer research developments and the status of collective bargaining.

• Scheduled for an early issue is an article covering time study investigations by the Tennessee Valley Authority as related to methods of construction and equipment operation, which will be of unusual interest to the construction industry.

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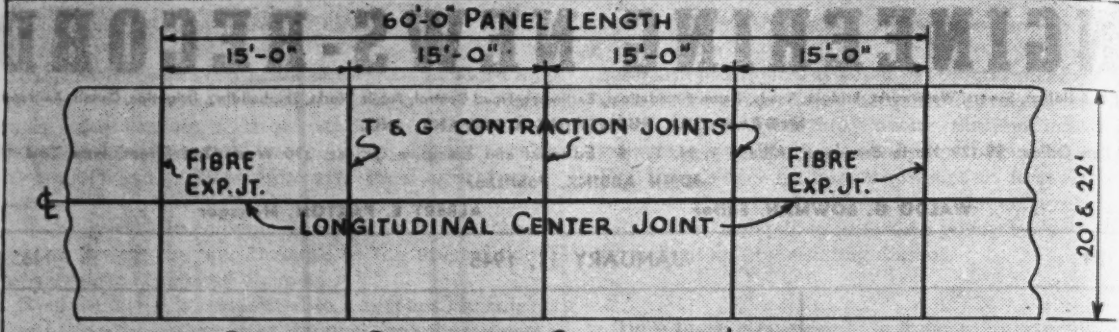
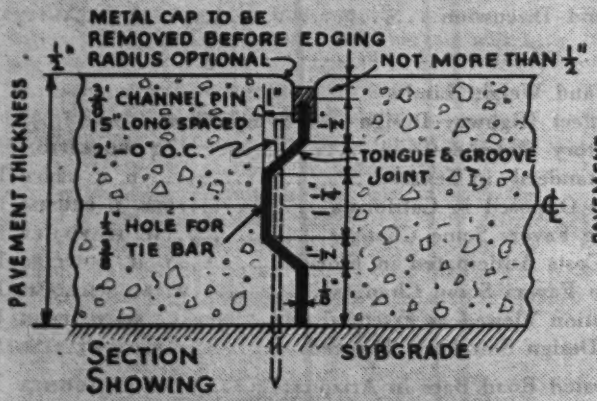
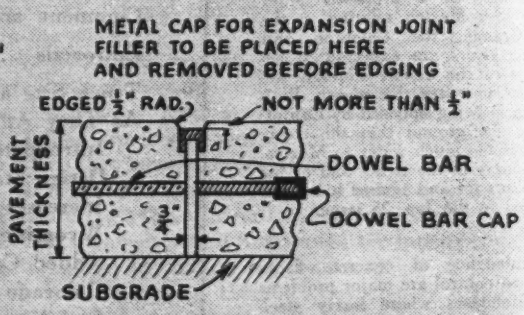


PLAN OF PAVEMENT SHOWING JOINTS

NOTE:- LENGTH OF PANEL BETWEEN EXPANSION JOINTS OPTIONAL BUT CONTRACTIONS TO REMAIN 15' CENTERS


METAL CAP TO BE REMOVED BEFORE EDGING
RADIUS OPTIONAL
NOT MORE THAN 1/2"
3/8" CHANNEL PIN 15" LONG SPACED 2'-0" O.C.
TONGUE & GROOVE JOINT
1/4" HOLE FOR 3/8" TIE BAR
PAVEMENT THICKNESS
SUBGRADE

SECTION SHOWING TONGUE & GROOVE LONGITUDINAL CENTER JOINT & CONTRACTION JOINT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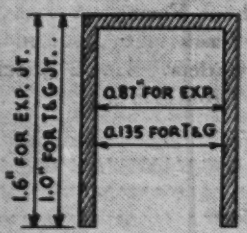
NOT MORE THAN 1/2"
PAVEMENT THICKNESS
DOWEL BAR
DOWEL BAR CAP
SUBGRADE

SECTION SHOWING FIBRE TRANSVERSE EXPANSION JOINT

NOTE:- ALL FIBRE EXPANSION JOINTS SHALL CONFORM TO AASHO SPEC. M-59-42

NOTE:- TONGUE & GROOVE JOINTS FOR LONGITUDINAL & CONTRACTION JOINTS SHALL BE ASPHALT MASTIC BOARD AS MANUFACTURED BY KEYSTONE ASPHALT PRODUCTS CO. OR EQUAL AS APPROVED (STEEL CENTER STRIP MAY BE MENTIONED IN SPECS. IF ENGINEERING AUTHORITY DEEMS NECESSARY



CAP FOR ALL JOINTS
#12 GA. STEEL

PLAN OF PAVEMENT SHOWING JOINT LAYOUT
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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JANUARY 11, 1945 • VOLUME 134 • NUMBER 2

N.Y. State is asked to push St. Lawrence power project

Governor Dewey says state should act if federal government fails to do so. Huge highway and public works program also recommended to legislature

"If the federal administration is unable or unwilling to proceed, then the state of New York itself should undertake to complete the project on a self-liquidating basis, in cooperation with the Dominion of Canada and the Province of Ontario"—so said Governor Thomas E. Dewey in his address at the opening session of the New York legislature of 1945 on Jan. 3. He referred to the St. Lawrence River seaway and power project, a measure for the completion of which was rejected by the U. S. Senate on Dec. 14, 1944.

In support of his recommendation the Governor said further: "After twenty years of discussion, the tremendous power potential of the St. Lawrence River still remains undeveloped. Its estimated 1,620,000 kw. would be the second largest project of its kind in this continent. Its beneficiaries would be the residents of this state and nearby areas.

"I recommend, therefore, that the state continue vigorously to assert its substantial rights and interests in the St. Lawrence development.

"For years I have advocated the completion of the St. Lawrence seaway and power project. During the last decade the means have been found and billions in federal funds have been appropriated to develop great rivers in other sections of the country, for power, navigation, flood control, irrigation and like purposes. The incomparable resources of the St. Lawrence River should no longer be wasted."

Billion for public works

Governor Dewey also outlined a program of state public works, to be undertaken in the postwar period, at a cost that might exceed a billion dollars.

The building program advanced by the Governor embraced three separate proposals. These are $800,000,000 for highways, the construction of parkways, and throughways; $100,000,000 for public works, to include the replacement of at least thirty buildings now being used by the Department of Mental Hygiene, and the establishment of a number of technical institutes.

Much highway work needed

Of highways, Governor Dewey said: "Much of our highways system is antiquated and in no way suitable either to the business or pleasure needs of the people of the state. Of the 13,000 miles in the existing highway system a careful survey shows that one-third are in need of immediate reconstruction. The balance of the system requires an increased program of maintenance as soon as the war will permit. Almost fifteen years have elapsed since there was any real attempt to make our highways adequate for modern traffic demands.

"The development of a modern highway system which can, with safety, be used at relatively high speed will be of immense value to the entire state. The Department of Public Works has prepared for the state, and is cooperating with municipalities in preparing for our cities, a minimum essential program for highways, thruways, parkways and grade-crossing elimination which in the coming years will require more than $800 million."

Office of Coordinator photo

Brazilian highway engineer visits this country

To obtain first-hand information on United States highway practices, Dr. Glovis Pestana (second from right), director general of the state of Rio Grande do Sul Highway Department of Brazil, is making an extensive inspection of highways of this country. The South American engineer is shown in Washington, D. C., with Maj. Gen. George C. Dunham (left), assistant coordinator and director of basic economy in the office of the Coordinator of Inter-American Affairs; Charles Upham (second from left), engineer-director of the American Road Builders Association, and Col. Maurice E. Gilmore, director of overland transportation in the Coordinator's office.

Many engineering bills put before new Congress

Record breaking action can be expected by the 79th Congress which convened last week if the large number of bills already introduced is any indication. Those already up for consideration which are of interest to the construction industry include:

S. 2, which provides federal aid for the development and repair of public airports; H.R.11, authorizing the Board of Engineers for Rivers and Harbors to prepare estimates and plans for improvement of certain rivers and harbors; H.R.474, authorizing improvement of East River at New York; H.R.518, providing for the construction and operation of flood-control and navigation improvements on the Arkansas and White Rivers, and for disposing of surplus electric energy generated by the federal flood-control and navigation improvements in the river basins; H.R.660, providing for survey of channel and harbor at Everglades, Collier County, Fla.

Also, H.R.661, authorizing and adopting the improvement of Miami, Fla., harbor; H.R.671, providing for the improvement of the Great Lakes-St. Lawrence Basin; H.R.1126, authorizing improvements in the South Canal of St. Marys River, Mich.; H.R.1129, authorizing the construction of the Umatilla Dam on the Columbia River in Oregon and Washington; H.R.31, amending public law 228 of the 77th Congress and, authorizing $145,000,000 to be appropriated and expended for flood control, power and navigation developments on the Alabama-Coosa Rivers in Alabama and Georgia; H.R.47, making available $2,900,000 for emergency flood-control work made necessary by recent floods in the Tulare Lake Basin, Calif.; H.R.58, authorizing negotiations and providing for the construction of an interoceanic canal over Nicaraguan territory.

Likewise, H.R.76, providing for the construction of a $1,500,000 Veterans' Administration hospital in Lawrence, Mass.; H.R.75, authorizing construction of a $3,000,000 veterans' Administration regional office building in Boston, Mass.; H.R.533, authorizing the Minnesota Department of Highways to construct, maintain, and operate a free highway bridge across the Mississippi River at Hastings, Minn.; H.R.541, authorizing the Commissioners of the District of Columbia to construct two 4-lane bridges across the Potomac River. (A similar bill, S.119, was introduced in the Senate). And S.35, a Rivers and Harbors bill providing $500,000,000; and H.R.1212, authorizing the state of Texas to acquire and construct a free bridge across the Rio Grande at or near Laredo.

Shasta Dam "topped off"

The last batch of concrete in California's massive Shasta Dam, second highest and largest structure of its kind, was poured the morning of Dec. 22.

The final pour took place in the roadway deck which will carry a highway across the crest of the 602-ft. high structure, key unit in the U. S. Bureau of Reclamation's Central Valley project. The event was the occasion for a congratulatory meeting between Ralph Lowry, (left), construction engineer, Bureau of Reclamation, and Frank Crowe, general superintendent for Pacific Constructors, Inc. Both men are veterans of many years of dam building and have been on the Shasta job since it was started in July, 1940, Lowry representing the government and Crowe the general contractors.

In addition two bills introduced dealing with the United States Public Health Service were introduced. These are H.R.587 and H.R.592, the former creating a division of water pollution control in that agency, and the latter provides for water-pollution-control activities.

• • •

Ecuador railroads head visits United States

Eduardo Mena, president of the Ecuadorian Railroads, is now in the United States, and, as the guest of the transportation department of the Office of Inter-American Affairs, is making an inspection trip to Chicago and other points to visit plants making railway equipment and supplies. Mr. Mena is a graduate of Lafayette College.

Most of the railways of Ecuador are owned by the state and operated by an autonomous board of directors. There is usually some degree of state control over the few privately owned lines also.

Tighter lumber control established by WPB

Tighter control over the distribution of lumber, made necessary by continued high war demand and decline in production, was announced Jan. 5 by the War Production Board.

"Because of the critical lumber situation, war needs and the most essential civilian needs for lumber can be met only by strict curtailment of all less essential uses," Mr. Krug said.

Order L-335 and eight directions to the order (Directions 1 through 8) were amended to reduce the amount of lumber that may be sold without control—that is, on uncertified orders—and to establish additional controls over particular species and grades that are in critically short supply.

Amendments to the eight directions to L-335 are designed to implement the general tightening of controls established by the amended order, and to establish further control over western pine and better grades of certain species of hardwoods. The amended directions also provide for smoother flow of lumber from mills to consumers and more equitable distribution of lumber to distributors for sale on uncertified orders.

• • •

Cement prices raised in mid-west by OPA

Manufacturers of cement in Wisconsin, Illinois, Indiana, western Kentucky, North and South Dakota, Minnesota, Iowa and eastern Missouri, have been granted an increase not to exceed 20c. per barrel in their present maximum prices, the Office of Price Administration announced Jan. 4.

The increase, which became effective Jan. 8, applies to all types of portland cement, except white cement, and includes masonry cement and other special types. The increased price may be charged where the sale is made f.o.b. at a mill within the area, or on a delivered basis to a point within the area.

Persons and firms reselling this cement without further processing may add to their present maximum prices the actual increased cost resulting from adjusted producers' ceilings.

A study of cost and other data of producers in the area indicates that this increase is necessary to meet the minimum requirements of law for this segment of the industry, which has materially diminished output, OPA said. It will cover adjusted total unit costs of the bulk of production which is needed (excluding the marginal high cost producers) to maintain minimum essential production.

U. S. Geological Survey plans postwar water program to cost $15,000,000

Repairs of installations, more gaging stations and observation wells, and the establishment of laboratories are included.

The U. S. Geological Survey has plans well advanced for a $15,000,000 postwar water program expected to furnish 2,000 man-years of employment in each of the first three postwar years. Although this program is small when compared to that of many other federal agencies, it represents a large expansion of Geological Survey activities, which are expected to cost more than $3,000,000 this fiscal year, including about one-third furnished by cooperating states and municipalities.

War has emphasized water needs

The water program of the Geological Survey has several major aims. These include: catching up in postponed activities, such as repair and rehabilitation of station installations; increasing the number of gaging stations now available, especially on small streams; addition of more observation wells to record the fluctuation in groundwater; establishment of laboratories to serve local needs for information as to the chemical character of both surface water and groundwater, and development of new and better instruments, equipment and techniques.

Such a program will require a large increase in the survey's present staff of about 500 engineers, geologists and chemists. About two hundred of these new jobs are expected to be filled by former employes of the Water Resources Branch of the survey now in the armed services. However, numerous new positions for engineers and scientific workers will remain to be filled.

Geological Survey engineers in their planning point out that the war has emphasized many important problems concerning the Nation's water resources and the need for the postwar program now being prepared. For example, in some areas of great industrial activity the limit of water supply has been reached or is in sight, while in others water-treatment problems have become acute because of the high quality of the water essential for industrial uses. Moreover, the marked increase in pollution of many rivers brought about by war industries has made the problems as to the quality of domestic water supplies much more numerous and important. Thus, the postwar program now being prepared calls for enlargement of much work now in progress and includes many additional investigations of the quantity, quality, availability and utility of both surface water and groundwater.

Much construction also is contemplated in the plans for rehabilitation and enlargement of U. S. G. S. stations. These plans are sufficiently advanced that the major portion of the work can be prosecuted actively when manpower and funds are available.

New devices and methods needed

Important as may be the improvement and enlargement in physical equipment of Geological Survey observation stations and laboratories, of still greater importance may be the development of new devices and methods, engineers of the Survey report. Work of this type now getting special attention includes: Improvements in geophysical instruments and techniques for investigating the availability of groundwater and its depth below the surface, design of instruments for measuring depths of rivers by asdic (the echo of sound waves) and by radar (the echo of electric waves), and development of a more accurate and satisfactory sediment sampler than that used heretofore.

Four key engineers in the U. S. Geological Survey discuss postwar planning. They are left to right: C. H. Pierce, senior engineer in the division of surface water, N. C. Grover, senior engineer in the administration division, Glen L. Parker, chief of the water resources branch, and C. G. Paulsen, assistant chief of the water resources branch. Mr. Grover, who retired in January 1939, came back into service in August 1942, which illustrates one way the Geological Survey is meeting the manpower problem.

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New Rivers and Harbors Bill offered in Senate

On Jan. 6 Senator Josiah W. Bailey of North Carolina introduced a new Rivers and Harbors Bill (S. 35) calling for a postwar construction program totalling about $500,000,000 in estimated cost.

Omitted from the bill are the controversial suggestions which led to the rejection of the former bill at the last session of Congress. Particularly noteworthy is the omission of that section of the old bill excluding from reclamation law limitations the Central Valley irrigation project in California.

Eliminated also are any projects which would duplicate those provided for in the flood-control bill passed by the preceding Congress, including the Missouri Valley program of the Army Engineers and the Bureau of Reclamation.

Also omitted from the bill are the $66,000,000 Tennessee-Tombigbee Waterway, the $400,000,000 St. Lawrence Seaway, a $25,000,000 program for the Santee and Congaree rivers in the Carolinas, and the $38,500,000 Beaver-Mahoning Waterway in Ohio and Pennsylvania.

Moisseiff memorial fund being raised by friends

As a memorial for the late Leon S. Moisseiff, famous bridge engineer, who died Sept. 3, 1943, a $5,000 fund is being raised to encourage research in structural engineering. The fund, to be administered by the American Society of Civil Engineers, will be used to provide annually a $50 prize and a medal for an outstanding paper on some phase of structural engineering. According to a statement issued by the Leon S. Moisseiff Memorial Committee from its headquarters at 393 Central Park West, Box 402, New York 25, N. Y., $1,000 has already been raised or pledged by the local committee in New York City. This prize will be the first administered by the A.S.C.E. restricted solely to structural engineering.

Under the sponsorship of this committee, a get-together of the friends and admirers of Mr. Moisseiff will be held at 7:30 p. m. on Jan. 17 in the President's Room of the A.S.C.E., Engineering Societies Building, 33 West 39th St., New York City. This will also be the first general meeting of the national committee, and election of officers is scheduled.

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Cleveland fights order for bridge removal

An impasse seems to have been reached regarding the removal of the Lower Main Avenue Bridge in Cleveland, Ohio, first ordered removed by U. S. Engineers within six months after May 8, 1944, on the ground that it is an unreasonable obstruction to navigation. Lieut. Col. N. J. Riebe, district engineer, has sent the city authorities notice that the city is liable to a $5,000 fine for every month the bridge remains standing.

The City Council has refused to make money available for the removal of the bridge on the ground that the demolition would isolate a section of the city engaged in war work, and that the bridge should not be razed until a new one can be built to replace it. Further, an attorney, Irwin Greene, has filed suit in Cuyahoga County Common Pleas Court enjoining the city from removing the bridge.

The War Department granted a 4-month extension for the razing, running to March 8, 1945, on the condition that removal operations would start before Dec. 15, 1944. Since removal operations were not started then, the extension was nullified.

MEN AND JOBS

Charles H. Spaulding, civilian employee of the water supply equipment branch of the U. S. Engineer Board, Ft. Belvoir, Va., since June 1943, has resigned to return to his consulting engineer practice in water purification at Springfield, Ill. His work at Ft. Belvoir was the development, design and testing of field equipment for water supply and procedures for operating such equipment. Also included was development of the diatomite filter used in water purification for field troops.

Raymond F. Frellsen, Philadelphia engineer, is now a captain in the Navy.

Gibb Gilchrist, former Texas State Highway engineer, and now president of Texas A. and M. College, has resigned as chairman of the Texas post-war planning commission to devote his full attention to his college duties. **Andy P. Rollins,** Dallas civil engineer, has been appointed in Gilchrist's place.

J. K. Black, Vermillion, S. D., has resigned as Clay County highway superintendent. He had held this position for the past four years.

Howard J. Sowden, of Minneapolis, Minn., has been appointed city engineer at Fergus Falls, Minn., to fill the vacancy caused by the resignation of **John Arneson.**

Carl E. Nelson and **George E. Skaggs** of the San Francisco office of the Donald R. Warren Co. have been presented with meritorious service medals by Captain Schneider of the Twelfth Naval District for engineering designs prepared for the San Francisco area of the Bureau of Yards and Docks.

H. K. Setzer, for the last five and a half years superintendent of public works at Hickory, N. C., has resigned to enter general construction work. He has done city work since 1927.

A second engineer has become a member of the federal cabinet of Canada, **Gen. A. G. L. McNaughton** having been appointed Minister of National Defense (Army) succeeding Col. J. L. Ralston, resigned. Gen. McNaughton retired from the Canadian Army a few weeks ago, having been promoted to a full general. He is a graduate of McGill University, and, after distinguished service during and after the last world war, served as president of the National Research Council of Canada from 1931 to 1939, when he took over the command of the First Canadian Army.

Robert Johnson has been appointed county engineer for Hardin County, Ia., with headquarters at Eldora. He was formerly city engineer for Knoxville, Ia., and previous to that was county engineer for Marion County for 21 years.

Transfer of **Capt. Malcolm Brown, Capt. W. B. Matlock, Capt. Walter Little** and **Lt. Byron Clark** to the Army Service Forces training center at Ft. Belvoir, Va., has been announced by Capt. Noble A. Bosley, executive officer for the Seattle District, U. S. Army Engineers.

Floyd A. Carlson, former planning engineer for Kenosha, Wis., has been appointed planning engineer of Racine.

John A. Dohlman, a former official of the Dohlman Construction Co. of Milwaukee, Wis., has been promoted from major to lieutenant colonel in the U. S. Army.

W. C. Olsen of Raleigh, N. C., has been employed as consulting engineer for proposed improvements to the municipal power plant at Kinston, N. C.

Homer A. Kerby, with the Fort Wayne, Ind., municipal utilities since 1938, has been named acting chief engineer, succeeding **W. T. Kehoe,** who resigned to become a partner in the Franklin Electric Co., Bluffton, Ind. **Clifford S. Franklin** will be responsible for map making and engineering on new sewer construction. He will be assisted by **Robert W. Watson.**

Francis J. Magnuson, civil engineer of St. Paul, Minn., has been chosen city engineer of Rochester, Minn. Mr. Magnuson has been with the St. Paul Department of Public Works for the las 21 years.

(*Continued on page* 162)

Considerable new highway legislation likely in 44 states during 1945

Anti-diversion of road funds, higher taxes, broader interstate reciprocity, and liberalizing of motor vehicle weights and sizes

Some interesting highway legislative possibilities for 1945 in 44 states are revealed in a survey just completed by the National Highway Users Conference.

Protection of highway funds—Legislation to give voters an opportunity to amend their state constitutions to prevent diversion of these funds is proposed in Alabama, Arkansas, Connecticut, Georgia, Illinois, Indiana, Maryland, Massachusetts, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Wisconsin, and Wyoming.

Increased highway user taxes—Threats of higher gasoline or other motor vehicle taxes are reported from Arkansas, California, Colorado, Connecticut, Idaho, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas, Utah, West Virginia and Wisconsin.

Broader motor vehicle reciprocity—This is expected to be sought in Arkansas, Connecticut, Florida, Idaho, Iowa, Maine, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Mexico, North Dakota, Tennessee, Texas, Wisconsin and Wyoming.

Several states report efforts to increase local sharing of state auto taxes.

More liberal sizes and weights—Efforts to get legislation for more liberal motor vehicle sizes and weights are reported from Arkansas, Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Maine, Massachusetts, Minnesota, Nebraska, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Vermont, West Virginia, Wisconsin and Wyoming.

Other highway user matters expected to occupy the attention of some state legislatures include speed limits, financial responsibility, restoration of diverted revenues to highway funds, increased regulatory control of commercial motor vehicle operators, and highway safety legislation.

JOBS OF THE WEEK

PLANT, Houston, Texas

Brown & Root, Houston, Tex., will construct and operate an ammunition plant. The cost of construction and equipment is $3,000,000. Defense Plant Corp. will finance.

CHEMICAL PLANT, Neville Island, Pa.

Lummus Company, New York, will build 6 small buildings for chemical plant expansion for Pittsburgh Coke & Chemical Co., Pittsburgh, Pa. The estimated cost is $1,000,000.

WAVES QUARTERS, San Francisco, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing quarters for WAVES to Dinwiddie Construction Co., San Francisco, at $931,800.

SHOULDERS STABILIZATION, San Diego, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for shoulder stabilization at Naval Air Station to R. E. Hazard & Sons, and Clyde W. Wood, Inc., Los Angeles, at $1,038,670.

FREIGHT CAR REPAIR SHOPS, Brainard, Minn.

Northern Pacific Railway Co., B. Blum, chief engineer, St. Paul, awarded a contract for piling, grading, tracks, and foundations for freight car repair shops, to Al. Johnson Construction Co., Minneapolis. The total estimated cost is $1,500,000. Toltz, King & Day, St. Paul are the engineers and architects.

PORT FACILITIES, Dominican Republic

Republic of Dominica, Cuidad Trujillo, will enlarge and improve port facilities including 1,000-ft. extention to breakwater, 820 lineal feet reinforced concrete bulkhead, 2 steel and concrete warehouse, by own forces. The estimated cost is $2,000,000.

STOREHOUSE, Terminal Island, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for the construction of a warehouse to James I. Barnes, Construction Co., Santa Monica, at $1,420,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 253.

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States' share of federal road aid is allotted

The first $500,000,000 of the $1,500,000,000 recently authorized by Congress for the construction of roads has been apportioned among the states, the District of Columbia, Hawaii and Puerto Rico, it was announced Jan. 7 by Maj. Gen. Philip B. Fleming, Federal Works Administrator.

As soon as Congress votes the funds, $100,000,000 of the first half billion dollars will be available for the making of surveys, plans and purchases of rights-of-way. The other $400,000,000 will not be available until the end of the war emergency is officially proclaimed or until a joint resolution of Congress authorizes the use of the money. Cities and counties are to share in the funds authorized under the postwar highway act.

General Fleming describes the road program as "the most all-embracing ever undertaken by the federal government in cooperation with the states."

Thomas H. MacDonald, Commissioner of the Public Roads Administration, says that the PRA is now ready to receive project proposals from the states as to what postwar projects are to be financed with the new money when it is available.

The summary of the new federal-aid highway act published in our issue of Dec. 21, vol. p. 787, was in error with respect to the use of funds for grade separation work. Only 50 percent of the right-of-way costs paid from public funds can be paid from the federal funds. Our summary said that the entire cost of both land and construction could be paid out of federal funds. Not more than 10 percent of the federal funds apportioned to a state in any year can be used for the separation of railway grades.

OBITUARY

William Augustus Illsley, 91, retired contractor died at Montclair, N. J., Jan. 1. He built the original mills of the United States Steel Corp. at Gary, Ind., the largest steel plant in the world at the time of its erection in 1906.

P. L. Haskins, 58, divisional state road engineer, died at De Land, Fla., Dec. 29.

Charles W. Hummer, 72, contractor, of McAllen, Tex., died recently at Sulphur, La. Mr. Hummer built many major buildings in the southwest and south, including the Louisiana State Capitol at Baton Rouge.

Joseph R. Kitson, 54, project engineer for the New Britain, Conn., Housing Authority, and formerly a construction engineer with the Michael A. Connor Co., Hartford, died at New Britain on Dec. 25. He had served for four years in the U. S. Engineer Corps at West Point, N. Y.

Edwin W. Currier, 70, president of the E. W. & P. B. Currier Construction Co., Amesbury, Mass., died there on Dec. 31.

Frederick L. Packard, 47, former civil engineer for the Louisville Board of Works, Louisville, Ky., died Dec. 20, at Evansville, Ind., where he was directing a flood control project for the U. S. Engineer Corps. He was a graduate of The University of Michigan.

John Chalmers, 81, veteran building contractor of Tacoma, Wash., died Dec. 17.

Christian De Boer, 66, for many years an employee of the U. S. Engineer Department, died Dec. 27 in Stuart, Fla.

Frank W. Capp, 57, structural engineer for the Portland Cement Association for the past 17 years, died Dec. 22 in Chicago. He attended the University of Missouri, receiving a bachelor of science degree in civil engineering in 1909 and a civil engineering degree three years later. Mr. Capp's first job was with the American Bridge Co. at Toledo, Ohio, following which he taught civil engineering for two years at the University of Missouri. In 1912 he resigned to go with the Kansas City Terminal Ry., later joining the bridge department of the Great Northern Ry. at St. Paul, Minn., as a designer until 1920. He was an authority on railroad roadbed stabilization by pressure grouting.

Edwin T. Stewart, 66, engineer and head of the Arizona state water department, died in Glendale, Calif., Dec. 19.

T. Milton Fowble, 90, surveyor, died at St. Paul, Minn., Jan. 3. He was a surveyor on many state, city and private buildings in St. Paul, and also laid out a number of townsites.

MEETINGS

National

CANADIAN CONSTRUCTION ASSOCIATION, annual meeting, Chauteau Frontenac, Quebec, Canada, Jan. 15-17.

AMERICAN ROAD BUILDERS' ASSOCIATION, 42nd annual meeting, Stevens Hotel, Chicago, Ill., Jan. 16-19.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, Hotel Commodore, New York City, Jan. 17-19.

ASSOCIATED EQUIPMENT DISTRIBUTORS, 26th annual meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 22-24.

Regional and Local

TOLEDO SECTION, OHIO SOCIETY OF PROFESSIONAL ENGINEERS, Secor Hotel, Toledo, Ohio, Jan. 16.

NEW YORK SECTION, AMERICAN WATER WORKS ASSOCIATION, midwinter luncheon meeting, Pennsylvania Hotel, New York, N. Y., Jan. 17.

MISSISSIPPI SOCIETY OF PROFESSIONAL ENGINEERS, annual meeting, Heidelberg Hotel, Jackson, Miss., Jan. 19-20.

PHILADELPHIA DISTRICT, AMERICAN SOCIETY FOR TESTING MATERIALS, symposium on magnetic particle testing, Hotel Benjamin Franklin, Philadelphia, Pa., Jan. 22.

NEW YORK STATE COUNTY HIGHWAY SUPERINTENDENTS ASSOCIATION, annual meeting, Albany, N. Y., Jan. 24-26.

NORTH CAROLINA SOCIETY OF ENGINEERS, winter meeting, Hotel Sir Walter, Raleigh, N. C., Jan. 26-27.

CONSTRUCTORS ASSOCIATION OF WESTERN PENNSYLVANIA, annual meeting, William Penn Hotel, Pittsburgh, Pa., Jan. 31.

WISCONSIN COUNTY HIGHWAY COMMISSIONERS' ASSOCIATION, annual winter highway conference, Schroeder Hotel, Milwaukee, Wis., Jan. 30-Feb. 1.

COLORADO SOCIETY OF ENGINEERS, 29th annual convention, Shirley-Savoy Hotel, Denver, Colo., Feb. 1-3.

IOWA ENGINEERING SOCIETY, 56th annual meeting, Hotel Ft. Des Moines, Des Moines, Iowa, Feb. 6-7.

WESTERN CONSTRUCTORS, INC. AND WISCONSIN CHAPTER, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC., joint convention, Oshkosh, Wis., Feb. 13-14.

ILLINOIS HIGHWAY ENGINEERS AND COUNTY HIGHWAY SUPERINTENDENTS, annual conference, at University of Illinois, Urbana, Feb. 14-16.

NEW JERSEY SECTION, AMERICAN WATER WORKS ASSOCIATION, winter meeting, Winfield Scott Hotel, Elizabeth, N. J., Feb. 8.

OHIO SOCIETY OF PROFESSIONAL ENGINEERS, annual convention, Deshler-Wallick Hotel, Columbus, Ohio, Feb. 15-16.

SOUTHEASTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual convention, Thomas Jefferson Hotel, Birmingham, Ala., Feb. 21-22.

ARKANSAS ENGINEERS CLUB, annual convention, Hotel Marion, Little Rock, Ark., Feb. 23-24.

Cancellation

Even though their conventions would have been concluded before Feb. 1, in deference to the suggestion of James F. Byrnes, Director of War Mobilization and Reconversion, the National Sand and Gravel Association and the National Ready Mixed Concrete Association have cancelled their formal meeting programs at New York. The board of directors of the National Sand and Gravel Asociation will meet at the Hotel New Yorker on Jan. 22 and 23 and the board of directors of the National Ready Mixed Concrete Association will meet at the same place on Jan. 24 and 25. Active and associate members are being invited to attend these board meetings.

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Motor truck production to be doubled in 1945

Almost twice as many commercial motor trucks as were manufactured in 1944 have been scheduled for production in 1945 by the War Production Board. A total of 245,449 commercial trucks are programmed for 1945, which compares with 126,678 in 1944, the WPB reports.

Production of all types of trucks will be increased with exception of light and heavy-heavy off-highway types. The largest increases will be made in mediums and light heavies.

The Week in Engineering and Construction
Continued on page 156

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Engineers and Building Codes

Sir: As a subscriber to *Engineering News-Record* since long before its present name, and knowing your interest in matters that affect the welfare of the engineering profession, I felt impelled to write you about a situation that may be of interest to a considerable portion of your readers. It may be that you can help us with a suggestion or two as to how to proceed.

The city of Toledo (like Cleveland and many other cities) is overhauling its sadly out-moded building code. We managed to have incorporated in the revision a clause that plans for structures (except small houses) should be prepared and submitted by registered architects or engineers. Ohio has an architect's registration law that simply protects the name "architect" but anyone can prepare plans if he is careful about how he designates the service. Ohio also has an engineer's registration law with somewhat more force that requires political subdivisions to employ an engineer (or architect) on all public structures costing in excess of $5,000. There is, at present, no control over private construction.

Such a clause was written in but soon was violently objected to by the small house builders. From the correspondence it seems that they have organized to fight such a movement all over the country. Since small houses are specifically exempted, they must have larger game in sight. When you observe the bland way in which laymen enter a building, ride on its elevators, use its escalators, and tacitly assume its absolute safety it is apparent that some sort of public protection is desirable. Such a clause is not intended to restrict the business to a select group, but is intended to center responsibility in the hands of those best able to carry it, and in the hands of people who could be disciplined by being disqualified to practice should such a step be necessary. It is unnecessary to list all of the safety, sanitary, fire-protective, and load carrying factors that enter into modern building design.

Unless the technically trained architects and engineers succeed in protecting themselves their functions will be still further usurped by the contractors who are already taking over a good part of it. Of course, there is nothing to prevent a contractor from having on his staff licensed architects and engineers, nor is there any good reason why he should not; but there is every reason why plans should be prepared by competent practitioners no matter what their method of compensation may be.

It happens that I am practically an innocent by-stander to all of this, but I feel quite strongly that there is no point in a technical man's spending a lot of money on an education, on registration fees, society dues and technical material, and a lot of time in maintaining the profession on a high level, if any carpenter or builder is in a position to render ostensibly the same service just so long as he is careful what he calls it. It is not to the interest of the public (and that includes all of us) to enter hotels, apartments, crowded department stores, and the like not knowing who takes the responsibility for their safety.

Quite a long story could be written on this subject. This should be sufficient to indicate the problem. How are the architects and engineers to protect themselves? They might employ legal talent or one of their more politically minded members to state their case. They might use national magazines and local papers to show the service they render. Their professional societies should respond 100 percent, but, to date, seem to have been at best luke-warm.

From your general survey of conditions not only all over the country but all over the world you might have a couple of very worth while suggestions. Unless the technical group is able to render a service and make it well understood, they will disappear from the picture. The situation in Toledo is only part and parcel of what is going on in half a dozen Ohio cities and several outside of Ohio.

This is the most thorough overhauling of codes I have seen in the 35 years I have known something about the building business, and now is the time for action. A success in any one place would form a precedent in others. I can see many advantages to the public as a whole and fail to see where any particular group of contractors or subcontractors would suffer.

Trusting that any suggestions or ideas that may be helpful will be passed along to us and with many thanks.

RAYMOND C. REESE
Consulting Engineer
Toledo, Ohio

Vacuum Processing For Concrete Ships

Sir: Referring to my article "Powered Concrete Ships of World War II", *ENR* Oct. 19, vol. p. 473, I wish to ask that you clarify the statements with regard to use of the vacuum process on the concrete. The use of vacuum was discontinued for the walls only. Removal of excess water from both bottoms and decks of the ships, using the vacuum process, was continued with good results on all of the construction.

ROBERT E. MCLAUGHLIN
Chief Engineer
McCloskey & Co.

Correction of a Comment

Sir: Reference is made to my comment in the December 14, 1944, issue of *Engineering News-Record*, vol. p. 741, on the article 'Simplified Pipe Bend Formulas" by Peter J. Mascaro in *ENR* Sept. 21, 1944, vol. p. 372. Upon checking further into the matter, we find that in Case No. 1 angle ϕ was used, instead of its complement $90 - \phi$ in the formula for angle a.

The correct formula should read;

$a = 90° - \phi + \theta$ Case I

instead of

$a = \theta + \phi$ Case I.

J. F. MALLOY
Construction Engineering Department
Carbide & Carbon Chemicals Corp.
Charleston, W. Va.

EDITORIALS

VOLUME 134 NUMBER 2

January 11, 1945

ENGINEERING NEWS-RECORD is a consolidation of Engineering News and Engineering Record, effected in 1917. The Contractor was consolidated with Engineering News-Record in 1918. Engineering News was founded in 1874 as The Engineer and Surveyor, which title subsequently became The Engineer, Architect and Surveyor, Engineering News and American Railway Journal and finally Engineering News. Engineering Record was established in 1877 as The Plumber and Sanitary Engineer. Subsequently it became The Sanitary Engineer, Engineering and Building Record, and, finally, Engineering Record. All rights to the above titles are reserved.

Future Highway Design

BEGINNING IN THIS ISSUE is discussion of a subject of major importance to the future of highway design—the size and weight limits that should be set for highways to be built in the future. A review of this discussion indicates that from the viewpoint of truck builders, an increase in allowable chassis width to 102 in. is of more importance than the higher axle loads asked for by the truck operators. This is a new proposal which deserves serious consideration. If more economical vehicles can be built under an authorized increase of 6 in. in chassis width, then highway engineers should determine what effect, if any, such a change would require in their current design standards. As lane widths have increased three or more feet in the past two decades, it appears probable that the proposed increase in chassis width could be authorized without a further increase in lane width.

Trends in Cost of Materials

"LUMBER IS COSTING MORE and steel and concrete are costing less" was the challenging remark made recently to a group of Western engineers. In the ensuing discussion the only concession was in the matter of definitions. The lumber that costs more, it was admitted, is a quality product. Curiously enough, the argument centered wholly on lumber; no one objected to the statement concerning steel and concrete. Perhaps champions of a material rise to its defense only in response to criticism. The availability of ring connectors, plywood and laminated members, as well as prefabrication and the wartime scarcity of structural and reinforcing steel have all been factors in shoving timber "out front." The past year or two have seen some novelties as well as substantial progress in new designs with structural lumber. Probably it *is* costing more, but for the higher price a better product can be expected. That expectation has not always been realized under the pressure and difficulties of wartimes. But the facilities are there and the postwar opportunity is great. Timber was used long before other structural materials came into vogue and the long history of improving the product has by no means come to an end.

Moisseiff Honored

A MOVEMENT has just been started to honor the late Leon S. Moisseiff and perpetuate recognition of his contributions to the art of structural engineering by a prize to be awarded annually by the American Society of Civil Engineers for a paper on some structural engineering subject adjudged to be the best of such papers written during any one year. This plan is to be commended for two reasons. First, because Mr. Moisseiff richly deserved such an honor; and second, because the A.S.C.E. now has no award specifically allocated to the structural field, although some of its general awards can be, and on occasion have been, made for papers in that field. New opportunities for research in structural engineering should open up in the years immediately following the war, therefore, a plan such as this to stimulate dissemination of knowledge of these new developments will aid progress in structural engineering as well as honor an engineer who did not fear innovations simply because they were untried. Moisseiff will be doubly honored if the awards go to men who have the courage to propose bold advances based on logical deductions.

Geographic Job Distribution

PROPONENTS OF POSTWAR PLANNING, particularly those concerned with waterworks, will find it useful to study the Construction Trends section (page 1) of the Dec. 28 issue of *Engineering News-Record*. Here is given a 23-months' summary of waterworks projects proposed and on which plans have been started, classified by state and regional distribution; in addition there is provided a parallel listing of the needs for each of the areas as determined from an inventory made by the U. S. Public Health Service. Thus an opportunity is afforded to compare what is being done with what should be done. Some of the findings are most revealing. For example, in the Middle Atlantic region proposed work already exceeds estimated needs by 72 percent, while in the Southern states projects proposed

represent only 14 percent of the needs in this region. Using another yardstick, the Middle Atlantic states again lead by having put into the planning stage waterworks projects equivalent to $5.83 per capita; in contrast to this the Southern states thus far have planned projects only to the extent of 27 cents per capita. Those who are concerned with the promotion of postwar planning might profitably apply the findings from this and similar studies as a guide to areas where more effective promotion is required. Good geographic distribution as well as large volume of work are correlative objectives in providing postwar job opportunities.

Expanded Responsibilties

NEW RESPONSIBILITIES have been placed on state highway departments by the postwar highway bill passed by Congress near the close of last year. Their own work is greatly expanded and in addition, they become the fiscal agents for distribution of the federal highway aid to the cities and counties in their states. They sought this latter responsibility in order to unify highway developments within each state to the greatest possible extent. Now that they have it, success will depend in large measure on the extent to which they delegate responsibility to the local agencies, especially to municipal public works departments.

In many respects the relationship of the state highway departments to the local agencies will correspond to that of the Public Roads Administration to those departments. This will be especially true in the case of the larger cities, which have functioning and well staffed street departments or public works departments. When outlining the procedure by which federal-aid funds are to be passed on to these city departments, it will be well for the state officials to recognize that one of the chief reasons for the present high regard for the Public Roads Administration is due to the large amount of responsibility that is left in the hands of the state highway departments. Certain basic design standards must be set up by the state highway departments, and final decision as to the routes to build or rebuild must be theirs also, but beyond that, the maximum amount of cooperation can best be attained by leaving detailed design, location and construction to the local authorities.

It is not so easy to generalize as to relations with the counties, because their organizations for road work vary so widely, even within a single state. In some states the highway department already has responsibility for the secondary roads for which federal aid is provided under the new act. In other states, the legislatures may give the department that responsibility under the federal-aid act. Many counties with small road agencies will need to expand them for proper expenditure of the new funds. In that expansion, the highway departments can be of major assistance and at the same time can pave the way for the closest possible cooperation.

In relations with both the counties and cities anything that tends to stimulate local initiative will be found to pay big dividends in the long run.

A New Field For Consultants

SOME STATE HIGHWAY DEPARTMENTS are retaining outside consultants to plan major highway routes, especially near and through large centers of population. This practice was started to obtain the services of specialists in one or more elements of the design work or to overcome local shortages of manpower. It has been found to have the added advantage of providing an objective view, unhampered by earlier ideas or by local pressure that may affect those who have for a long time been connected with a growing problem.

Outside consultants have more freedom to plan on what might be considered a grandiose scale if originated locally. In this connection, it is well to recall that experience indicates that regardless of how elaborate plans may seem when presented, by the time a new highway facility has been in service but a short while it seems always to have been too conservative. Hence, the wide latitude in planning that the outside consultant brings is to be encouraged.

One word of caution to the consultants may not be amiss. Excessive fees or attempts to displace state highway departments will cause a reaction that will be detrimental to consultants as well as to the planning of major highway projects. The furor that was raised recently in Baltimore over the size of the fee for consultants on proposed highway approaches to that city should serve as a warning.

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Truck Size and Weight Limits As They Affect Highway Design

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***Contents in Brief**—Moderate increases in size and weight limits for trucks were proposed last year for the projected National Interregional Highway System and still higher limits have been recommended for future highway construction by the American Trucking Associations. As a result, questions have been raised as to the effect of these proposed increases on existing highways and as to what standards should be applied in designing the main roads to be built under the great postwar roadbuilding program authorized late last year. In the following, the proposed standards are set forth and the views of state highway engineers from various parts of the country are given as to the effect of the operation of trucks built to those standards over existing highways and as to what higher limits would be acceptable in their states if higher limits are to be applied in new construction.*

OUTSTANDING among the questions raised by the unprecedented roadbuilding program that will get under way as soon as men and materials for that work are released by declining war demands is that of the truck load and size limits that should be used as a basis for the design of pavements and structures on those new highways. The war emergency brought about a wholesale relaxation of state restrictions on truck size and weight. This in turn brought widespread violation of the higher war-time limits, with varied results. Damage to some highways was very considerable, even to quite new pavements. On other highways, however, the higher loads were carried without serious injury. Truck operators, noting this, are now pressing for relaxation of some of the more restrictive state limitations in the interests of greater uniformity. They also are recommending the application of higher standards to new construction.

Effect of relaxation

Obviously, an immediate large increase in permissible axle loads would result in the destruction of thousands of miles of highway and a hastening of the breakdown of many more miles. The resulting loss to our highway system would be very great and the saving in transportation costs would be negligible because only a small part of the total freight movement by truck moves in very large trucks. On the other hand, continuation of artificially low limits on truck loads and sizes could check desirable trends toward more efficient truck transport without any commensurate economies in highway costs.

Some needless restrictions

Few people will deny that some state restrictions are artificially low. In many instances, the primary purpose of the restrictive statute was not so much to protect the state's highways from damage due to heavy trucks as it was to curtail the movement of big trucks because big trucks were a nuisance or a traffic hazard. In some instances the restrictions were designed to check the loss of freight to truckers by the railroads. Generally speaking, highway design trends have outdistanced the regulatory laws.

An unusual opportunity to study the merits of these restrictive regulations has been provided by the setting aside of the more restrictive ones as a war measure. State regulatory statutes can now be reappraised, and should be reappraised and modified if the study shows that they are a needless check on a logical development of highway transport. Such a study on a national scale was authorized at the recent meeting of the American Association of State Highway Officials.

That considerable progress has been made in attaining uniformity in limits on height and width of trucks and in axle loads is shown by Fig. 2, which is based on a study made by the Planning and Traffic Division of the Colorado State Highway Department in 1943. However, limits on length, on gross weight, and weights of truck-trailer combinations vary so widely as to show clearly that many of these limits were set arbitrarily rather than on a rational basis. They indicate the need for agreement on more uniform standards on a regional basis, if agreement on a national scale appears impractical due to varying physical conditions in the several parts of the country.

The height limit of 12 ft. 6 in. is common to 36 states; a width of 96 in. is permitted in all states, two states permit 102-in. widths, and one state has a limit of 105-in. All the 48 states now permit axle loads of 18,000 lb. or higher, but in some states the limit on gross load serves to nullify that provision to a considerable extent.

Wartime measures

Soon after this country entered the war, an effort was made to get nationwide acceptance of size and weight standards to facilitate the movement of war traffic. The outcome was an agreement on the part of all 48 states, acting through the Council of State Governments, to accept for the war emergency the standards given in Table I, which had been prepared by the Public Roads Administration. In actual practice, these weight restrictions have been quite widely exceeded under the plea that the overloads were necessary to speed

the war effort or to save truck space and tires. For example, in Colorado, at the urgent request of the truck operators, the Governor issued a proclamation in September, 1943, which permitted all overweight and overlength vehicles *operating at that time* to continue to operate for the duration of the war. Checks made by the highway department revealed many vehicles with axle loads of from 24,000 to 26,000 lb., and gross loads as high as 80,000 lb.

Limits for interregional system

About a year ago the National Interregional Highway Committee, headed by Thomas H. MacDonald, U. S. Commissioner of Public Roads, made its report to the President on a proposed system of interregional highways, which system was authorized by Congress in legislation passed at the end of last year. The committee said in its report that the proposed Interregional Highway System "shall provide or allow for the subsequent provision of facilities capable of serving safely and efficiently a mixed traffic of passenger automobiles, motor buses, and motor trucks and tractor-trailer or semi-trailer combinations, of a volume of each of the constituent elements estimated to be that which will exist 20 years from the date of construction. All roadways and structures built on the interregional system shall provide, either in their immediate design or feasible modification thereof, for the passage and support of vehicles and combinations of vehicles" of the dimensions and weights shown in Table II in the "frequency and distribution of such dimensions and weights to be expected 20 years from the date of construction."

It will be seen by comparing Table II with Fig. 2 that no major changes in permissible dimensions and axle loads were proposed by the committee. In fact, the proposed axle loads are not as high as those now permitted in several states. Gross loads, however, when computed by the formula proposed by the committee, are higher than those permitted in many states.

Higher standards proposed

In the latter part of last summer, the Sizes and Weights Committee of the American Trucking Associations, Inc., a national organization of truck operators, after a study of the report of the National Interregional Committee, recommended to the association that it sponsor a movement to have the limits on truck weight and size proposed by the latter committee liberalized. Speaking of the report of the National Interregional Highway Committee, the Sizes and Weights Committee of the A.T.A., said that it is probably the most comprehensive treatise on public roads and interregional highways that has ever been issued. However, the committee found what it characterized as impracticabilities in the report, which it said is understandable "since the operators of highway vehicles were not represented on the committee nor consulted by the Public Roads Administration as to the industry needs in a future highway program."

The A.T.A. committee endorsed the National Interregional Highway Committee's recommendation that minimum standards of design should be set up for the proposed system of interregional highways, but it found the standards proposed to be so low as to serve as a check on future developments in highway transport. It said: "In going over the report, your committee finds that the Public Road Administration and the National Interregional Highway Committee feel that the life of the structures, particularly bridges, which are to be built into this system of interstate highways, will be for a minimum period of 75 years. It is evident, therefore, that the standards of construction which will be adopted for these highways will control the design of equipment for a period of three-fourths of a century.

"No one can deny that in the last comparatively few years great technological advancement has taken place throughout the world, and certainly no one will deny that much

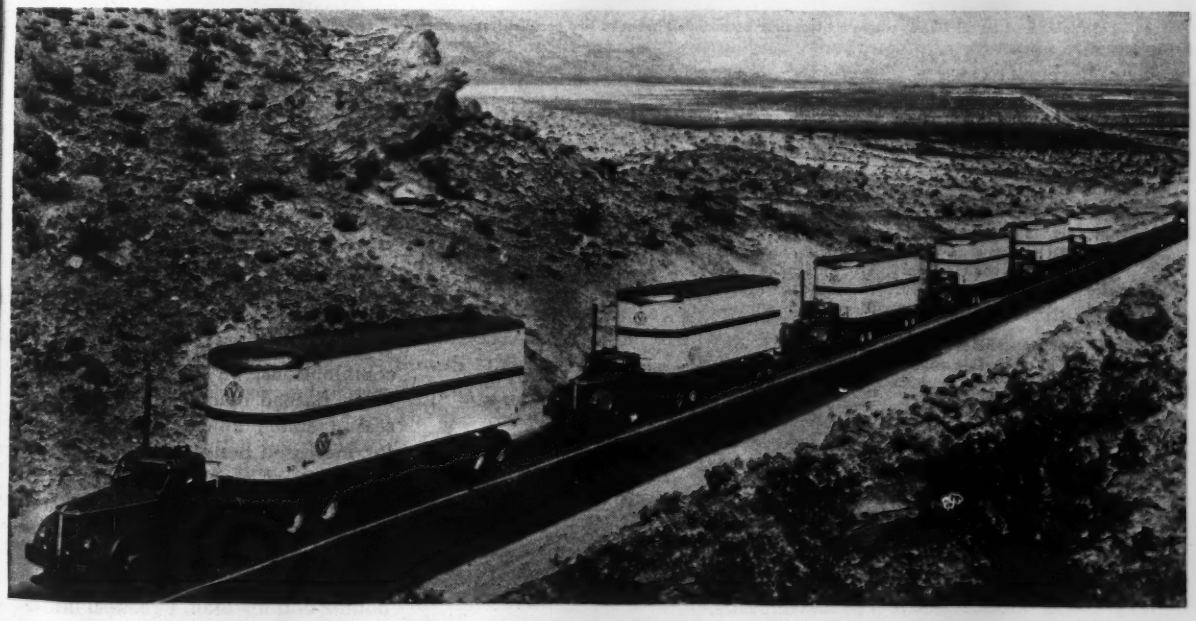


Fig. 1. Fleets of large trucks moving freight over highways require strong pavements and wide lanes for safe operation.

more advancement is expected in the coming years. Indications are that production will be increased and therefore faster and better distribution will be necessary. The fact that additional production and additional distribution will be necessary leads us to feel that improved highway transportation will be an absolute requirement to the nation's welfare and that highway transportation must be allowed to take advantage of every possible means of increasing its efficiency and reducing the cost of distribution.

"Because of the above-stated facts, we feel that this industry should request that the sizes and weights shown in the joint report as the minimum size of vehicles which the highway should be constructed to accommodate should be liberalized. We urge the imprudence of planning for 75 years in the future by holding to standards that are in existence at the present time, thereby preventing foreseen as well as unforeseen developments in equipment."

TABLE I—SIZE AND WEIGHT LIMITS ACCEPTED BY THE STATES FOR THE WAR EMERGENCY

Width	96 in.
Height	12½ ft.
Length, (1) A Single vehicle	35 ft.
(2) A combination	45 ft.
Weight, (1) Per inch width of tire	600 lb.
(2) On single axle	18,000 lb.
(3) On two axles	30,000 lb.
(4) On three axles	40,000 lb.
(5) On semi-trailers	40,000 lb.
(6) On other combinations	40,000 lb.

TABLE II—HIGHWAY LOADINGS RECOMMENDED FOR THE PROPOSED INTERREGIONAL HIGHWAY SYSTEM
(National Interregional Highway Committee)

Width	96 in.
Height	12½ ft.
Length (over-all, including bumpers and load)	
(1) Single vehicles	35 ft.
(2) Tractor-semitrailer combinations	50 ft.
(3) Other combinations	60 ft.
Axle Load* on pneumatic tires	18,000 lb.
Gross weight	
On any vehicle or combination of vehicles according to the formula	$W = C(L + 40)$

In which:

W = gross weight of vehicle in pounds.

L = Length in feet between the forward and rear axles of the vehicle or combination of vehicles or any group of axles thereof.

C = A coefficient with the following values:

For values of L less than 18 ft	650
For values of L equal to or greater than 18 ft	750

*Defined as the total load on all wheels whose centers may be included between two parallel transverse vertical planes 40 in. apart.

TABLE III—VEHICLE SIZES AND WEIGHTS AND CONSTRUCTION STANDARDS RECOMMENDED BY THE AMERICAN TRUCKING ASSOCIATION, INC.

A—Recommended minimum allowable vehicle sizes and weights:	
Width	96 in.
Height	12½ ft.
Length, (1) single vehicle	35 ft.
(2) tractor, semi-trailer	50 ft.
(3) other combinations	60 ft.
Axle load on pneumatic tires	18,000 lb
Gross weight according to the formula $W = C(L + 40)$ in which:	
C = 650 where L is less than 18 ft.	
C = 750 where L is equal to or greater than 18 ft.	
B—As minimum for future primary highway construction	
Width, overall	102 in.
Width, body	96 in.
Height	13½ ft.
Length, (1) single vehicle	40 ft.
(2) Tractor semi-trailer	50 ft.
(3) other combinations	65 ft.
Axle loads, (1) On high-pressure tires	18,000 lb.
(2) On balloon tires	20,000 lb.
Gross weight according to the formula $W = C(L + 40)$ in which:	
C = 750 where L is less than 18 ft.	
C = 850 where L is equal to or greater than 18 ft.	

Modified A.T.A. proposals

The standards proposed by the Sizes and Weights Committee, except for two significant changes made by the association's executive committee, are given in Table III. The changes relate to overall width of vehicle and axle loads. The executive committee added an overall width of 102 in., and reduced the axle load proposed by the Sizes and Weights Committee. The latter proposed 24,000 lb. on pneumatic tires; the executive committee cut this back to 18,000 lb. (the same as the figure in the interregional highway report) except for balloon tires which it set at 20,000 lb. The probable reason for these changes will be discussed later.

In commenting upon its proposals, the A.T.A. committee said: "In the height of vehicles we have suggested an overall height one foot in excess of that proposed in the interregional highway report. The reason for this suggestion is predicated upon our knowledge of present operations plus our desire to retain a safety margin for future vehicle design, and it also takes into consideration the fact that the underpass clearance as specified in the report is in no case endangered by the increase of one foot in height specifications.

"In the matter of length, we have suggested two changes. First, as to the straight truck—we suggest an overall length of 40 ft. instead of 35 ft.; the reason being that body capacity can and should be considerably increased to give capacity for greater loads as weight of vehicles is decreased by the more universal usage of new lighter metal alloys, some of which have already made their appearance in vehicle design.

"In the matter of overall length of combinations, we suggest a length of 65 ft. instead of 60, not only for the reason stated above as to the need for increased body capacity, but also due to a very practical operating condition involved in the use of two semi-trailers, one converted into a full trailer by the use of a dolly, moving what is known in our trade as a 'double-bottom' load. Practical utilization of this combination requires a

minimum of 65 ft. in overall length.

"In the computation of the load formula, we have permitted the coefficient 750 to be used on axle spacing less than 18 ft. and the coefficient 850 to be used on axle spacing of 18 ft. or more, instead of the coefficients 650 and 750, respectively, which were contained in the original report.

"Our reasons for changing these coefficients are based not only on our desire to plan intelligently for the future but also upon the necessity of accommodating existing equipment. The use of a coefficient of 650 lb. makes it impractical to use two standard semi-trailers in the combinations described above. This situation has already been recognized by several states and their present laws have been altered. The use of the 750 coefficient will eliminate this difficulty."

The committee went on to recommend that the Public Roads Administration be asked to include operators of interstate trucks in any future committee appointed to study the subject of truck sizes and weights.

Greater width favored

An explanation of why the executive committee of the A.T.A. inserted an overall width of 102 in. in the standards proposed by its Sizes and Weights Committee and reduced the committee's proposed axle load to a figure closely approaching the one set by the National Interregional Highway Committee can be found in a paper entitled "Some Engineering Aspects of Future Motor Truck Design," presented at the recent meeting of the American Association of State Highway Officials by B. B. Bachman, vice president, The Autocar Co., in which he said that his paper could be considered an expression of the viewpoint of the Motor Truck Committee of the Automobile Manufacturers Association, an association to which the A.T.A. looks for support in its campaign to get its proposed standards for the Interregional Highway System accepted.

Mr. Bachman came out strongly for an overall width of vehicle chassis of 102 in., and indicated that the manufacturers believe that this greater width is much more important to progress in motor-truck development than an increase in axle load. Mr. Bachman characterized the present axle-load limits as relatively unimportant in view of present restrictions

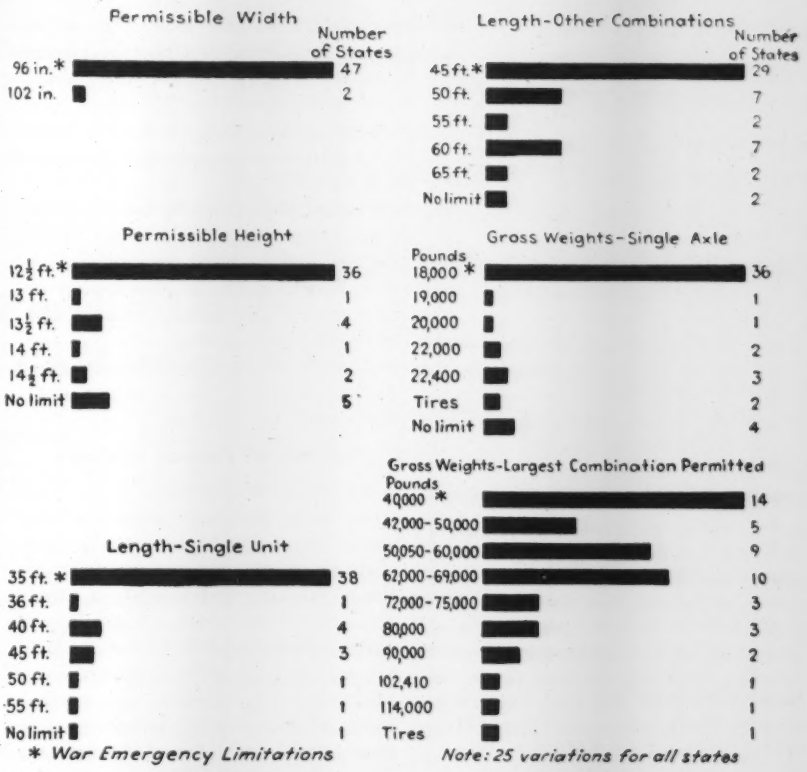


Fig. 2. A large amount of uniformity is found in state restrictions on width of motor vehicles, on height and axle loads, but limits on length and gross weight other than on a single axle vary widely.

on width. This, he said, is the "one factor that prevents the vehicle engineer from producing the best design within the limits of the other specifications." He added that it is "difficult to make designs that will provide for even the 18,000-lb. axle load, and with the most desirable construction it is impossible."

The tire size required for an 18,000-lb. axle load, Mr. Bachman said, is the 11.00, which is rated at 4,500 lb. on a 20-in. rim, 4,750 lb. on a 22-in. rim, and 5,000 lb. on a 24-in. rim. The Tire and Rim Association recommends that this tire be mounted on a 7.33V rim. On this rim the width of the tire, neglecting bulge at the ground and growth, is 11.2 in., although this dimension will vary slightly in different makes of tire. The recommended dual spacing, making allowance for the use of chain, is 13.5 in. Adding these figures results in a width over one pair of tires of 24.7 in., or 49.4 in. for two wheels.

"The frame width has, by general practice, been 34 in. for some years. This dimension is the minimum that will provide space for the engine and steering gear. While it is, of course, possible to reduce the width of frame to the rear of this point, it is undesirable in a heavily loaded frame. Adding the frame width and the spacing occupied by the four tires leaves only 6.3 in. between the inner tire and the frame into which the springs must be put."

Turning to the question of tires, Mr. Bachman said, "to secure optimum results at this load (18,000 lb.), the tires should be kept inflated to 70 lb. pressure and the maximum sustained speed should not exceed 35 mph. At 45 mph., the capacity is reduced 85 percent. Taking the 11.00 tire on a 22 in. rim as an illustration, it will be seen that if we run at 45 mph., the load should be reduced to 16,152 lb., or if continued at 18,000 lb., the mileage expectancy of the tire is reduced to 80 percent of the normal.

"To help this situation we can go to a larger tire, but as will be seen, there is not much encouragement. The 12.00 tire is normally made with 14 plies instead of 12, and the speed is reduced to 31 mph. for full rating,

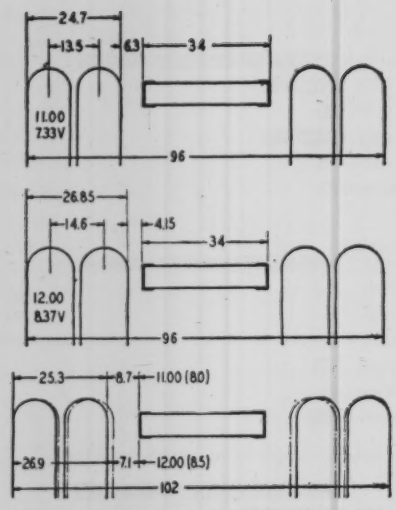


Fig. 3. Under the current 96-in. width limit for trucks, the spacing of tires and frames commonly used is that shown at the top. For the larger tires proposed by the tire manufacturers, the middle spacing is required, which seriously cuts down the space for springs. Favored by the Automobile Manufacturers Assn. is the 102-in. width shown at the bottom.

which for the 12.00 tire on a 24-in. rim is 6,150 lb. at 80-lb. pressure. At 45 mph. the load capacity is cut to 70 percent, or 4,300 lb., or just about enough to carry the desired 18,000 lb. axle." However, as the larger tire must be mounted on a wider rim, the available space or springs have to be reduced still farther to keep within the specified width. Mounted on a 8.37V rim with a recommended spacing of 14.6 in., the clearance available for springs is cut to 4.15 in.

Mr. Bachman went on to point out that if the truck designer were unhampered by artificial limits and used the 25.3 in. width for 11.00 tires proposed by the new tire makers' recommendations, he would have a total width of 111 in. This, Mr. Bachman characterized as fantastic. By making some compromise with ideal conditions he obtained an overall width of 101.2 in. "By making this an even 102 in., the space left between the tires and the 34-in. frame is 8.7 in., which provides reasonable space for mounting the springs and also permits the application of 12.00 tires with tighter clearances but still in a satisfactory manner."

In conclusion Mr. Bachman said: "In answer to the question as to why the 12.00 tire need be considered if the 18,000 lb. axle load is accepted, it can be pointed out that oversizing tires offer some attractive possibilities in increased tire life which have not been thoroughly explored in service. Furthermore, we have now, and will have for some unknown number of years, the necessity of considering the use of synthetic tires. While the tire makers have made a remarkable contribution in developing an alternate to the natural rubber tire, the difficulties increase with the size, and until the present differences are further reduced, the need for oversizing will be pressing."

Opinions of highway engineers

To get a cross-section of opinions from state highway engineers that would be helpful in drawing conclusions with respect to desirable limits on size and weight of motor vehicles, *Engineering News-Record* addressed an inquiry to the heads of several state highway departments, selecting departments in various parts of the country where varying geophysical and climatic conditions have to be met in building and maintaining highways. The questions put to the state highway engineers follow:

(1) In what major respects do the loadings you are now using in the design of your pavements depart from those proposed by the National Interregional Highway Committee?

(2) Has experience with heavier loadings authorized during the wartime emergency indicated that some or all of your present limitations could be increased without serious injury to your pavements?

(3) If so, could some or all of the increases be carried to the upper limits suggested by the American Trucking Associations?

(4) If the A.T.A. limit appears too high, what limits would you set?

(5) Do the limits proposed by the National Interregional Highway Committee appear satisfactory to you for (a) the parts of the Interregional Highway System that will be within your state; (b) your entire federal-aid system?

(6) Do you think that size and weight standards substantially higher than present ones should be applied in designing (a) pavements, and (b) structures for the projected interregional system?

Answers to these questions are given in the following statements, the replies being numbered to identify the question being discussed.

Highway Design Standards in Texas Approach Interregional Standards

D. C. Greer
State Highway Engineer, Austin, Texas

In 1941 our state legislature passed a law to govern the size and weight of vehicles. The limitations given in the accompanying table were set up.

Since the above law was passed it has been our guide in the design of our major highways. We consider that standards of design to provide for traffic complying with the above law are adequate for both the present and reasonable future.

Replying to the specific questions raised in your inquiry:

(1) For our major highways the loadings we are now using in the designs of our pavements do not differ greatly from those proposed by the National Interregional Highway Committee. Our designs are based on an axle load of 18,000 lb. and a wheel load of 9,000 lb. We, of course, depart from this design for our sec-

TABLE V—SIZE AND WEIGHT STANDARDS FOR TEXAS ESTABLISHED IN 1941.

Width	96 in.
Height	12½ ft.
Length—single vehicles	35 ft.
Length—combinations	45 ft.
Gross weight	38,000 lb.
Axle load—high pressure tires	16,000 lb.
Axle load—low pressure tires	18,000 lb.
Wheel load—high pressure tires	8,000 lb.
Wheel load—low pressure tires	9,000 lb.

Formula: $W = C\ (L + 40)$ where W = gross load in pounds, $C = 700$, and L = distance in feet between first and last axles.

(Cont. p. 28)

ondary and farm-to-market roads. (2) Loads authorized during the war time emergency have proved detrimental to our pavements, and, in our opinion, the present load limit could not be raised without injury to our highways. Of course many of our pavements were not designed in accordance with our present design standards. Prior to 1941 the loads permitted on our highways were much less than those permitted at the present time and our highways were designed for the lighter wheel loads.

I have no comment to make on the other questions at present.

Increases Over Present Limits Opposed in California

Fred J. Grumm
Assistant State Highway Engineer,
California Division of Highways, Sacramento

HIGHWAY loadings have been recommended by the National Interregional Highway Committee which are practically the same as those adopted by the Western Association of State Highway Officials at Reno in 1937, and approved by the American Association of State Highway Officials. When the present California law was framed, it was agreed that the W.A.S.H.O. axle load of 18,000 lb. was satisfactory, but that one wheel load should be made 9,500 lb. instead of 9,000 lb. to allow for a reasonable amount of unbalance or shifting of load.

In order not to cut down the hauling capacity of vehicles that had been operating in the state for many years, it was agreed that the coefficients in the formula could be raised to 700 for axle spacings 18 ft. or less and 800 for longer spacings, instead of 650 and 750, respectively, recommended by the N.I.H.C. It was also found advisable to raise the maximum weight limit for certain types of vehicles constructed in accordance with the old law.

Engineers for the manufacturers and large trucking concerns have stated that such vehicles could have been built to conform with the permanent provisions of the law if they had known of it in time. A period of ten years in which to replace these vehicles was incorporated into the law, during which time the coefficient would be 800 for spacings between 14 and 18 ft. and 850 for spacings not less than 25 ft., and not more than 40 ft. (a maximum load of 68,000 lb.). Except for particular vehicles that only operate under a special permit, the existing law causes no serious limitation on the unrestricted operation of any of the present types of vehicle.

The Sizes and Weights Committee of the American Trucking Associations recommends that a general increase in the size and weight maximums set up by the W.A.S.H.O. be provided for in the design of interregional highways. In practically all respects their recommended maximums exceed those of the California law, which is now more liberal in its provisions than the laws of practically all other states. This brings up the question: What is the basis for the present restrictions? They are based not only on pavements but on formulas designed for the protection of bridges. The safe coefficients to be used in the California law were determined by estimating the stresses that would be produced in various types and span-lengths of bridges by any of the presently practicable vehicles under the limitations of a maximum axle weight, length limitation, and maximum concentrations of loading permitted by the formula. To change any of these factors makes it necessary to reconsider the whole problem.

Proposals have been made to raise the maximum axle load, particularly on balloon tires, to 20,000 lb. or more. The static effect on pavements is largely a factor of the weight and loaded area on a single wheel, but repetition of heavy loads is the principal factor in the design of surfaces and pavements. While it can be argued that certain eastern states allow as high as 24,000 lb. per axle, these vehicles, as a rule, are operating in metropolitan areas. Furthermore, these states generally limit the gross weight and maximum length of vehicle to such a degree that the general effect on stresses in bridge members is not as great as in the case of California's lighter axle load but heavier concentrations.

It is argued by the A.T.A. Sizes and Weights Committee that the maximum length of 60 ft. is insufficient for the proper design of so-called "double-bottom" loads which have two semi-trailers, one of which can be converted into a full trailer by the use of a dolly. There are hundreds of such vehicles now operating on California highways with the maximum 60-ft. length. These vehicles are quite satisfactory and operate with well-distributed loads, each less than the 18,000-lb. maximum. If the length of the combination is raised to 65 ft. it would permit a gross load of 86,000 lb. on the combination, instead of the present 76,000 lb. under the California law and this could not be done without raising the axle loadings above the 18,000 lb. maximum.

Variations in limits questioned

The recommendation that interregional highways or any other particular system of highways should be designed for a greater vehicle load than elsewhere is subject to question. Should there be the same standards for portions of the interregional highways within metropolitan areas as for the portions crossing sparsely settled areas? On the other hand, why should there be any difference between the load limits on the portions within metropolitan areas and on other important highways in the same area. It has not been found practicable to enforce different weight limits on adjacent highways. Vehicles traveling the interregional highways usually must turn off at some point to reach their ultimate destination. Experience shows that the operators are not willing to cut down their loads, drop off trailers, etc., in order to conform with lower size and weight limits on the final portion of highway. This is proven by the difficulties that have arisen when different regulations apply on each side of state boundaries.

California with its variety of climatic conditions, topography and traffic requirements and the general condition of its present roads face the same problems as all the other states.

From its inception the California state highway system, amounting to approximately 13,000 miles of rural roads has been underfinanced. The 86,000 miles of county and other roads are in a still worse predicament. The difficulties inherent in this general situation requires the use of stage construction starting with relatively low types of surfacing. The life of these roads is comparatively short and the cost of maintenance is high under present traffic conditions. Many old inadequate pavements are likewise being kept in service by an excessive amount of maintenance and a minimum of improvement. Increasing the weight of vehicles above the present limits would seriously aggravate this condition, especially since heavy trucks are found on all types of roads.

Many weak bridges

The standards of design for bridges built during the past fifteen or twenty years has been based on a loading that is actually lighter than the existing maximum allowable weight in California. Furthermore, about 250 bridges on the state highway system have been posted for less than legal loads; and some 800 more, due to design and condition, are not up to minimum standards of modern design practice, which means high maintenance costs and reduced service life. This situation also demands at least a status quo in vehicle weights.

Careful investigation and survey of the state highway system prior to the war revealed the fact that traffic requirements were increasing at a more rapid rate than the improvements of the highways. Actually we were falling behind with our improvements in 1939 at a rate of about 150 miles of surfaced roads and 38 bridges per year. Since that time, the state, the counties and the cities have been further handicapped in maintaining the highways in adequate condition due to war restrictions on new construction, reduction in gasoline tax revenues, and reduced personnel, particularly in the engineering and maintenance groups, due to loss of men to the armed services and war industries. While our ability to maintain the highways has been handicapped, our traffic studies show an increase in the last five years of as much as 45 percent in truck registrations and 67 percent increase in heavy loads on the state highway system. There has been no decrease in heavy trucking as a result of the war, and this does not refer to military vehicles, but simply to privately owned and operated trucks.

The overloading of trucks beyond the legal limits has been found to be a serious cause of deterioration of our roads and bridges, which also shows the impracticability of increasing the weight limits in California above the present very liberal provisions of its motor vehicle code.

Wyoming Favors Some Changes

W. H. Fisher
Bridge Engineer, Wyoming Highway Department

YOUR INQUIRY concerning motor vehicles addressed to J. R. Bromley, superintendent of the Wyoming Highway Department was referred to the writer for reply. The six questions asked therein are answered below in the order given in your inquiry.

(1) We assume that the word "pavements" in your questions means "highways and bridges" in general.

Our present restrictions for size and weight of motor vehicles, by 1935 statute, are given in Table IV.

From the above tabulation it is seen that items (a), (b), (c-1) and (d) are exactly the same as set up in the National Interregional Highway Report. The remaining items are all smaller than set up in either that report or in the American Trucking Associations proposals.

(2) During the war emergency, on all truck movements of a national-defense character, we have largely waived our statute limitations for motor vehicles. However, we have been checking axle and total gross loads on these loads by means of the formula: $W = 700(L + 40)$, which formula was regularly used by us prior to the war for "special permit" loads, that is, loads which were permitted for one trip only with certain precautions observed en route. On national-defense loads, however, this formula is being applied merely as a precaution, not only to ascertain the actual magnitude of any load but also to insure the safe delivery of the load, by possibly rerouting some extra-heavy outfit so as to avoid any weak bridge. Actually, however, very few of these defense loads to date have ever exceeded our special-permit formula for weight, nor have they been delayed very long due to any rerouting.

The above special-permit formula will allow gross loads 16.7 percent greater than our statute formula for regular traffic. Some few of these defense loads have actually exceeded our statute gross-weight formula by as much as 25 percent, but the large majority of them have come well within it. Also, none of them has been either overheight or overwidth, although some few have been overlength.

Some problems due to overweight

To answer your question as to whether our experience with defense loads would justify any increases in our present standards: This is a bit difficult, since the defense loads have come at a time when there is very little general traffic on the highways. The matter of oversize has therefore been of relatively less importance than in normal times. The matter of overweight is more positive, and while in a few instances some maintenance has been occasioned by heavy defense loads getting too close to outside edges of our oil-mat pavement, we could not say that this maintenance has been in any larger proportions per load than we would have in normal times.

In other words, as we see it, we can not use our experience with defense loads, as any grounds for increasing our limitations for either size or weight of vehicles, for regular or general traffic.

(3) We prefer to discuss the proposed American Trucking Associations standards after discussing the standards in the National Interregional Highway Report, hence we will return to the question later.

(4), (5), & (6). We fully realize the urgent need for general adoption of some uniform code of motor vehicles standards by all 48 states. We

also realize the impracticability of trying to maintain two standards within the same state, one to apply to National Interregional Highway System only, and the other to apply to the remaining highways. As mentioned under Question 1 above, the N.I.H. standards happen to include four items that exactly agree with our own present standards. The N.I.H. standards are being sponsored after much study and consideration of all involved factors, with which the N.I.H. committee is probably more familiar than any other one group in the entire country. With these points in mind, and although it would mean a revision upward of our present standards for length and gross weight of vehicles, we strongly favor the adoption of the N.I.H. standards to apply for *all highways* throughout the country, including the National Interregional Highway. In some states this will doubtless mean a more serious revision of their present standards than it will in this state, but we believe that some such procedure is the only way out of the present maze of conflicting regulations.

With us, the most serious revision involved is that of gross weight for vehicles. The N.I.H. formula will permit total gross loads 25 percent heavier than our statute formula, where vehicles are more than 18 ft. long. However, the limitations imposed on concentrations of load occurring within an 18-ft. length, together with the 18,000-lb. limit for any one axle load, effectively reduce the severity of the N.I.H. load formula when applied to existing bridges designed say for A.A.S.H.O. H-15 loading, so that the actual stress increase, above the design stress, on any bridge members would probably never exceed 18 percent. We can go on record that we are willing to stand these increased stresses on our existing bridges, in order to secure the benefits of having a nation-wide standard established—but *only on this condition.*

We do have one positive objection to the N.I.H. gross-weight formula, however, namely the mathematical discontinuity or "jump" in total gross loads it permits when the vehicle length changes from "less than 18 ft." to "greater than 18 ft.", this "jump" amounting to 5,800 lb. It seems to us that this could easily be eliminated as follows, using the same letters as per their formula: Let $C = 650$ for vehicle lengths less than say 16 ft. and let $C = 750$ for vehicle lengths greater than say 20 ft. Then for vehicles from 16 to 20 ft. long, let $C = 650 + 25(L - 16)$. Our objections to the said "jump" are not so much mathematical, as they are on psychological grounds, in that a truck operator may easily deduce that if his outfit happens to be 5,000 or 6,000 lb. overweight, particularly where slightly less than 18 ft. long, it will not be considered very serious, and we believe that any court would probably sustain such a viewpoint. Hence, we think the "jump" in the N.I.H. weight formula should certainly be eliminated in some way before the formula ever becomes a law, either state or national.

TABLE IV—SIZE AND WEIGHT RESTRICTIONS ON WYOMING HIGHWAYS

(a)	Width	96 in.
(b)	Height	12½ ft.
(c)	Length (over-all):	
(c-1)	Single vehicles	35 ft.
(c-2)	Any combination	45 ft.
(d)	Axle load (any tire)	18,000 lb.
(e)	Gross weight for any vehicle or combination of vehicles, formula: $W + 600\ (L + 40)$	

Note: W and L in formula are same as defined in the National Interregional Highway Report, and $C = 600$ for any and all groups of two or more consecutive axles.

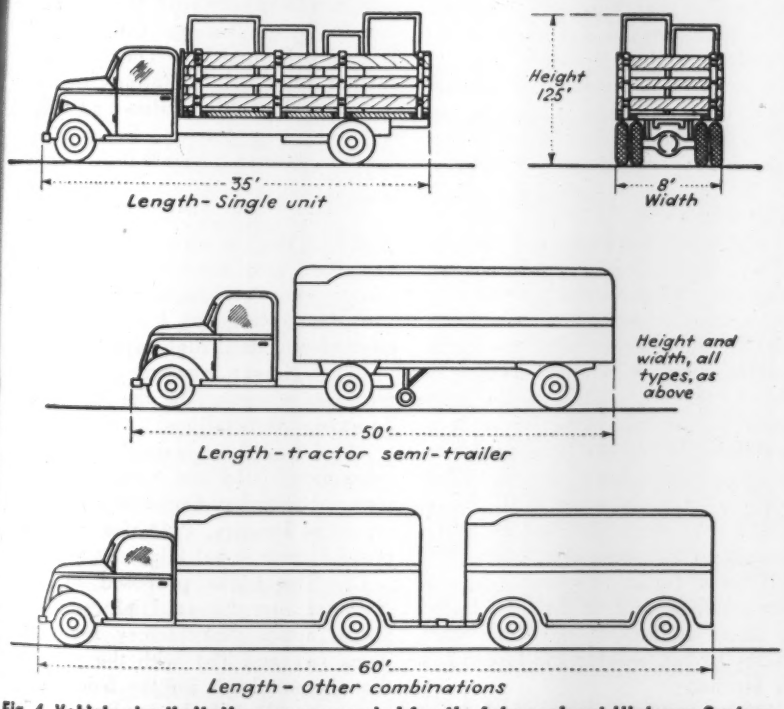


Fig. 4. Vehicle size limitations recommended for the Interregional Highway System.

Proposed A.T.A. standards

(3) To return now to the proposed American Trucking Association's standards. We cannot conscientiously favor any of the increases indicated: A.T.A. over N.I.H. standards. Now that we have finally made our lane widths fairly safe for the 96-in. vehicle width, which has been standard for so many years, the A.T.A. wants to widen vehicles to 102 in., which will simply nullify part of the safety we now have.

Likewise the A.T.A. proposed 13½-ft. height appears to us to be especially hazardous. It is true that all our underpass structures provide 14-ft. minimum vertical clearance when built. It is also true that in general the actual height of the average truck load is often subject to careless measurement in the first place, or subject to possible variations en route due to loosening or displacement of some objects on the load. There is also the vertical rebound or bounce of loads to consider, due to spring-action, where pavements are not perfectly smooth. If all trucks were built with closed-in tops like furniture vans, we might not object to a 13-ft. standard height, but with trucks and operators as they are just now, we are opposed to any increase in the 12½-ft. height,

which also has been standard for many years in most states.

The A.T.A. proposed increases in vehicle lengths over the N.I.H. standards appear off-hand to be rather "painless;" but for regular legal traffic we believe the N.I.H. standards for length had best not be increased—at least not until after many states, like our own, have first had a good chance to try out the N.I.H. lengths. Likewise we do not favor the A.T.A.'s proposed 2,000-lb. extra allowance for balloon tires on axle-loads. As far as bridges are concerned, a weight is a weight, regardless of type of tire.

As regards the A.T.A. formula for gross weight of vehicles, we find that even though limited to a 60 ft. length, and axle loads limited to 18,000 lb., their formula loads would produce overstresses in our existing bridges up to about 30 percent, or roughly one and one-half times as great as the N.I.H. formula would produce. We therefore can not conscientiously approve the A.T.A. formula loads for our existing bridges, and we feel we have gone far enough when we say we will approve the N.I.H. load formula as previously herein stated.

We would like to add that one must not get the impression, because we have talked mostly about bridges, that our concern about load formulas only involves bridges. On our oil-mat pavements over the state we find that excess loads in general can be just as destructive to pavements as they are damaging to bridges. Therefore, aside from bridges, we would not want any loads on our highways heavier than the N.I.H. standards would allow.

No Justification Found in Florida For Added Highway Costs

J. H. Dowling
State Highway Engineer, Tallahassee, Fla.

Aside fom the technical angle there is, in my opinion, a very important feature which I do not find included in the six questions sent to state highway engineers by *Engineering News-Record*. I refer to the added costs these liberalized standards would impose on all of the highway users regardless of class or distinction.

The highway department's obligation, primarily, is to construct and maintain highways for the use of the motor-traveling public, consistent with funds collected through taxation from that same public for such highways. The use of highways is not restricted to any class or group. Any person who properly qualifies by passing a simple drivers license examination, is permitted to drive a motor vehicle of some description on Florida's highways.

The rules and regulations governing the use of these highways take into consideration the requirements of and the protection of these motor vehicles and their human occupants and cargo. Each individual and each type of transportation, as far as it has been possible to do so receives as much consideration under the regulations and in our construction and maintenance programs as is consistent to the requirements and needs of all individuals and all groups.

It would be unfortunate, if a small group of motor-vehicle owners, in order to obtain benefits for that group, exert pressure for special benefits, the burden of paying for which would necessarily fall on the remaining and much larger groups who do not have the collective power nor the means to gather themselves into an organization to combat unfairness.

It is my opinion that the large trucking companies have always received every consideration in their highway problems in so far as it is possible to do so when these problems are properly related to the other groups of highway users. Particularly is this true when the fact is again brought to the front that heavy for-hire truck traffic represents only a very small percent of the total traffic on rural highways and the other groups by far, assume the larger gas tax burden.

A cooperative survey carried on during the year 1936 by the State Road Department of Florida and the Bureau of Public Roads (now the PRA) brought out that of the total travel in the state on all roads and streets the for-hire trucks accounted for only six-tenths of 1 percent of that total. In that same year, 1936, passenger cars traveled 77.1 percent and private trucks 19.4 percent of all the mileage made. It would not seem reasonable that these types of vehicles should be asked to assume the larger burden of paying for the increased standards of highway design which would be required in order to meet the truck designs which are being suggested by the American Trucking Associations for the interregional highways. The added cost for the increase in these designs would mean less mileage of new construction.

Answering the questions in the same order as listed in your letter of Nov. 20, 1944:

(1) We are now designing pavements to carry wheel loads from 7,500 to 9,500 lb. per wheel. Our designs vary from 9-7-9 for concrete highways to a compacted 6-in. base for rock-base surface-treated road. The heavier design is used on the more traveled routes and the lighter designs on secondary and feeder roads. I would state therefore that our standards for heavy travel roads compare favorably with those recommended by the National Interregional Highway Committee. The state has further qualified limitations of 550 lb. per inch width of tires and additional braking for vehicles carrying loads in excess of 16,000 lb. per axle.

Higher loads caused damage

(2) It has been the experience of this state that the heavier loadings which were authorized during the war time emergency have adversely effected our rural highways.

(3) I cannot approve any of the increases suggested by the American Trucking Associations.

(4) I would not exceed the limits recommended by the National Interregional Highway Committee in their report of January, 1944, for the proposed Interregional Highway System.

(5) The limits proposed by the National Interregional Highway Committee appear satisfactory for both items (a) and (b) with the proviso that the standards for the federal-aid system would only be applied if and

when construction or reconstruction became a future necessity.

(6) The size and weight standards should not be increased over the standards as set up for the projected interregional system.

Present-day truck dimensions and loads carried are of such size and weight that any increases would seriously effect travel safety for the great majority of highway users.

I sincerely hope that truck builders can improve existing designs without large increases in axle loads or in outside dimensions of trucks to operate over public highways.

I therefore take the positive position that the standards as recommended by the National Interregional Highway Committee in January, 1944, for the proposed Interregional Highway System be accepted and that no further increases to these standards be considered.

Colorado Considers N.I.H.S. Standards Generally Acceptable for Its Roads

W. M. Williams
Director, Planning and Traffic Division
Colorado State Highway Department, Denver, Col.

(1) Your first question refers to design of pavements. In 1938 the Colorado Highway Department built its last stretch of concrete pavement of any length and that was a 7-mile section built to the thickness of 9-7-9 in. At the present time we are not designing any concrete pavement for the proposed interregional highways but are planning those roadways for an asphaltic oil surface. Therefore the base for the oil surface will probably be designed along the same pattern and design as the design for main highways built in the several years just prior to the war.

(2) Colorado adopted, in 1942, the War Emergency Limitations to be in effect for the period of the war. However, loads—and particularly axle loads—considerable in excess of the War Emergency Limitations are being operated on Colorado's highways as a result of a proclamation issued by our Governor in September, 1943, which permits overweight vehicles to operate. As a result of this experience with heavier loadings, the Colorado Highway Department is definitely on record as opposed to loads which exceed 18,000 lb. per axle and is also opposed to liberalizing the formula $W = C(L + 40)$ above 750 for the value of C.

In this connection it is worthy of note that we have registered more than 700 vehicles which are operating loads in excess of the War Emergency Limitations. The axle loads on these vehicles run as high as 26,000 lb., and we note that in practically all cases where only one axle load exceeds the 18,000-lb. limit, that excess is on the driving axle of a semi-trailer. In other words, manufacturers must give considerable attention to the designing of their vehicles to more evenly distribute the weight in order that the excessive weight may be taken off the driving axle. We recognize also that faulty loading may be the prime cause of the excess on this particular axle.

(3) The Colorado Highway Department is opposed to any limitations exceeding the 18,000-lb. per axle, the formula, $750(L + 40)$, and the limitation of 50 ft. for the overall length of combinations of vehicles. Due to the curves and grades on many miles of mountain roads in Colorado, the department is not in favor of lengths exceeding 50 ft.

(4) The Colorado Highway Department feels the limitations proposed by the National Interregional Highway Committee for the Interregional Highway System are, in general, fair and reasonable and therefore is opposed to any higher limits recommended by the A.T.A.

(5) Whether the routes proposed for the Interregional Highway System in Colorado will be the final routes agreed upon in this state is a moot question as there is considerable objection to the routes originally proposed and in which selection of routes the highway department does not concur. Consequently the answer to this question has to be qualified.

If the routes as now proposed become the final routes agreed upon, then the highway department could probably agree to the truck limitations proposed by the interregional committee. However, the department could not approve all those limitations for the entire federal-aid system in the state because, as mentioned above, of the curves and grades on part of the federal-aid system in Colorado's mountain areas.

(6) The answer to your question concerning the use of substantially higher size and weight standards in

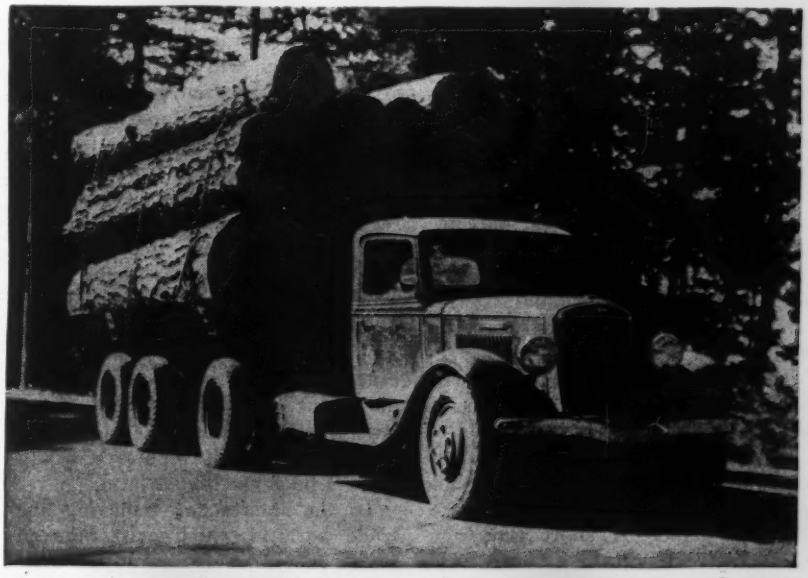


Fig. 5. Overloaded trucks hauling logs create a major problem for highway departments of Pacific Coast states.

design is "No", for the reason that the Interregional Highway System will comprise only a very limited mileage and if size and weight standards are substantially higher for the Interregional Highway System it will be difficult to confine vehicles built to such standards to operation on the interregional system only. Naturally, feeder lines to the interregional system will have to be designed and built to higher standards also.

Stabilization Viewed as Essential By Authorities in Illinois

W. W. Polk
Chief Highway Engineer, Springfield, Ill.

The problem of size and weight limitations is involved. Highway administrators are faced on one hand by the demands of the motor-transport interests for more liberal regulations, and on the other by the duty imposed upon them to expend public funds allocated for highway construction wisely and in the best public interest, and to protect by adequate traffic regulation life and public property. Their problem, therefore, is one of establishing size and weight regulations that will best serve the interests of the public; that is, to place regulation on a basis, consistent with public safety, which will strike a proper economic balance between pavement life and the benefits to be derived from advancements in motor transport.

Some limit necessary

It would simplify the problem greatly if the motor-transport interests would stabilize their demands at some reasonable level and be content to operate under such limits for a definite period of years. This is hardly to be expected, however, since their demands stem from a desire to carry heavier loads, limited only by the ability of the automotive industry to develop increasingly larger vehicles with greater load capacities. Developments in vehicle design probably will always exceed pavement capacities, because of the great difference between the respective service lives of vehicles and pavements.

The present situation illustrates that the demands of the motor-transport interests cannot be expected to become stable. A short time ago these interests were vigorously promoting the universal adoption by the states of a set of limitations very similar to those now proposed by the National Interregional Highway Committee, particularly the 18,000-lb. axle load. Now, when it appears probable that these limits will be adopted by most states, but before such action has been taken, one of their groups has already set a higher goal for its promotional activities.

In Illinois, and in other states, there is a large mileage of pavements which do not have the capacity for carrying loads greater than the present legal limits. If these pavements are required to carry a considerable volume of vehicles heavier than now permitted by statute, their service life will be seriously affected.

It is frequently suggested that more liberal regulations be established for interstate traffic and at the same time maintain more conservative limitations for intrastate traffic. In fact, the establishment of the Interregional Highway System under a coordinated plan of design will provide a system of highways between states capable of carrying heavier loads than are now permitted by regulations in most states. It is generally conceded that it is not practical to have two sets of regulations in a state, the higher one for designated truck lines and the other for the remainder of the highway system. The enforcement of such a plan could not be accomplished by a police force of any reasonable size. Since regulation is effective only to the extent of the enforcement of the laws, it is obvious that size and weight limitations on all highways would have to be at the higher level.

In the interest of removing the trade barriers which exist between states, the states should adjust their individual codes for the regulation of traffic to conform to a reasonable, uniform standard. As a standard for universal adoption, the limits proposed by the National Interregional Highway Committee in January, 1944, might be used with the following revisions:

Length of tractor-semi-trailer combinations	40 ft.
Length of other combinations	50 ft.

These reductions in the length of combinations are suggested because it is neither practical nor safe to operate longer combinations on a major portion of the nation's highways. This is particularly true in cities, where combinations having the lengths now permitted have difficulty in turning at street intersections without crossing into the opposing traffic lane.

The above discussion briefly outlines some general aspects of this problem. Answers to your specific questions follow:

Present pavement conditions

(1) The pavements built in Illinois in recent years and those now being built should be adequate for the loadings proposed by the National Interregional Highway Committee, admitting, however, that frequent application of such loads would probably result in some reduction in the economic life of pavements built prior to 1940, which constitute a large portion of the Illinois paved highway system.

(2) There is definite evidence that the heavier loadings now prevailing have damaged some of the pavements in this state. A permanent increase in present limitations would result in increased maintenance costs and a decrease in the service life of the thinner pavements.

(3) The A.T.A. proposes a 20,000-lb. load for axles equipped with balloon tires and an 18,000-lb. load for axles with high pressure tires. There is no logical justification for permitting additional load on axles equipped with balloon tires. The proposed concession is based on the result of tests which indicated that the impact force under wheel loads was considerably lower for balloon tires than for high-pressure tires. Only forces were measured; stresses produced by the forces were not determined. It is our belief that such differences as were found in impact forces will not produce any important difference in flexural stress in concrete pavements, because these forces are not active

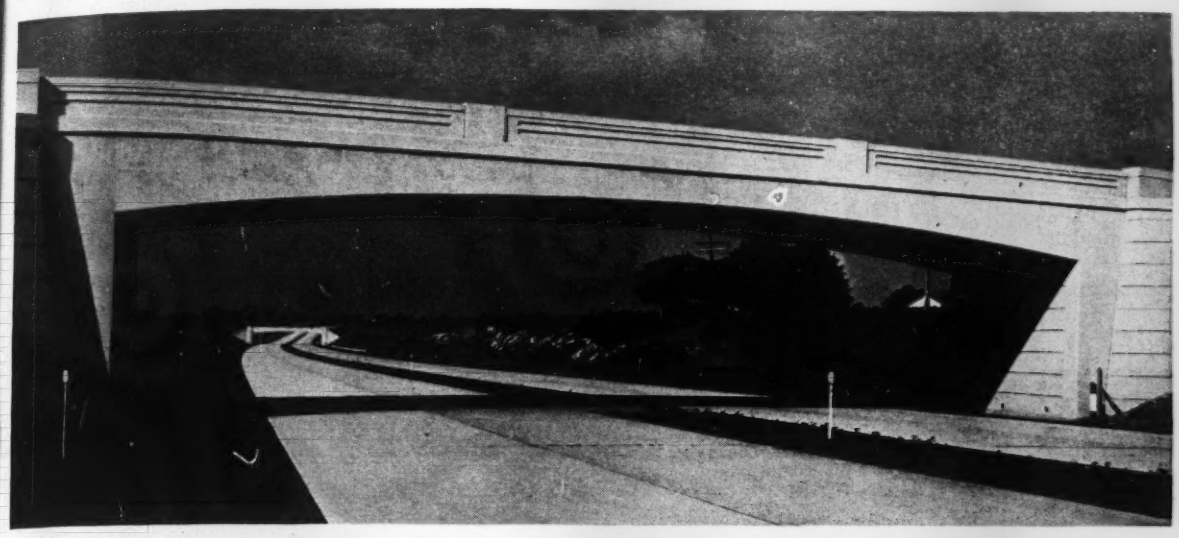


Fig. 6. Most modern highways are designed to standards equal to those proposed for the Interregional Highway System.

for a sufficient length of time to overcome fully the inertia of a pavement slab. Balloon tires distribute the load over a somewhat greater contact area than high pressure tires of equal load capacity, resulting in a slight reduction in slab stress. Computations indicate that due to this, about two percent more load can be carried on balloon tires, a difference so small as to be of no practical significance. The width, height, length, and gross-load limitations are all too high.

(4) It is suggested that for the regulation of traffic in the immediate future, the limits proposed by the National Interregional Highway Committee, with the revisions in length of combinations given above, be used. The higher length limits proposed by this committee may be adopted later if the volume of postwar construction of pavements, designed for the higher standards, is sufficient to warrant it.

(5) The limits proposed by the National Interregional Highway Committee would be satisfactory for a part of the Interregional Highway System that will be within this state. Some of the limits are too high for parts of the federal-aid system, but, as pointed out, it would not be practical to have two sets of regulations.

(6) The size and weight standards which this state is now using in designing pavements for highways, where a large amount of heavy traffic is anticipated, are satisfactory for pavements on the projected interregional highway. It should be mentioned, however, that the weight limitations now being used in designing pavements exceed the statutory limitations. For a number of years the H2O loading of the A.A.S.H.O has been used as the basis for designing all structures on the Illinois primary system. The H20-16S loading probably should be used in the design of all structures on the projected interregional system.

Higher Design Standards Favored For Future Road Projects in Kansas

R. C. Keeling
State Highway Engineer, Topeka, Kan.

The laws of Kansas permit a width of 96 in., height 12½ ft., and single vehicle length 35 ft., but no provision is made for a longer vehicle in the semi-trailer type than 35 ft. Other combinations can be 45 ft. in length, and the axle loading on pneumatic tires, 18,000 lb. The same formula for gross loading is used, but no difference is made in the length above or below 18 ft. and the *C* coefficient is 700. From this you will see that our laws permit sizes and weights very close to those suggested by the National Interregional Highway Committee and would be the same as far as design standards are concerned.

In answer to your questions:

(1) We use the same design standards as are proposed for the Interregional Highway System.

(2) Our present limitations could not be increased with the exception, possibly, of the length on some of the units.

(4) I would advise that the limits set up by the National Interregional Highway Committee are high enough and should be maintained.

(5) The limits set up by the National Interregional Highway Committee are high enough for both the interregional system and the federal-aid system, in view of the fact that it would be years before an interregional system could be constructed under definite standards, and trucking on our highways would be over many miles of highway below the standards of the Interregional Highway System.

(6) Size and weight standards should be substantially higher than those recommended by the National Interregional Highway Committee for the design of our structures and pavements, especially on our major highways. The location and standard of the road must necessarily be taken into consideration.

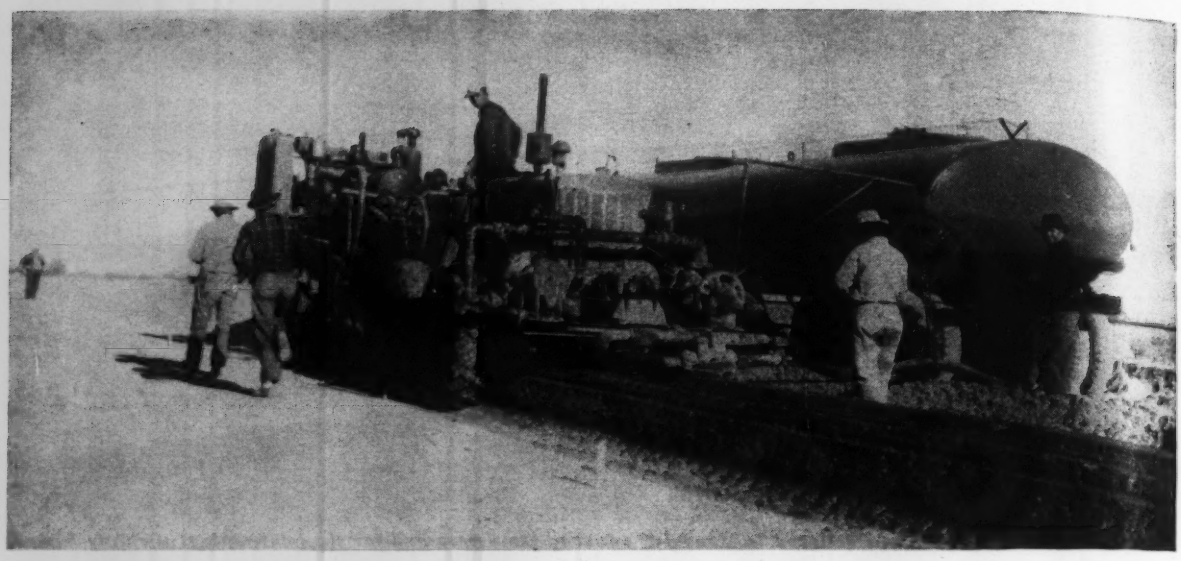


Fig. 1. Water was added to the road base by the traveling mixer, the water being supplied by a tank truck.

Cement-Treated Road Base Built in Arizona

Bernard Touhey
State Highway Engineer, Arizona Highway Department
Phoenix, Ariz.

***Contents in Brief**—Traveling-mix methods of applying cement to a road base were used last year in Arizona to gain experience in that type of low-cost road construction. Gravel aggregates were applied to both the shoulder and the pavement area, but cement was added only under the surfacing. Both the cement and water to obtain the desired density were added to the aggregate by a traveling mixing plant. After spreading, the mix was rolled with both steel and pneumatic rollers to consolidate the mix.*

A CEMENT-TREATED BASE, a comparatively new low-cost method of surfacing light-traffic roads, has been placed on an important section of Arizona's strategic highway system. The road, completed last year by the state highway department, begins 27 miles northwest of Phoenix and extends toward Wickenburg on U. S. 60, 70 and 89, a distance of 7.6 miles.

Cement-treated base was pioneered by the State of California (*ENR*, May 22, 1941, p. 807 and July 31, 1941, p. 175). The highway department there started with road mixing but switched to plant mixing in 1939 when it built a road of imported granular material by plant-mix methods using from two to three sacks of portland cement per cubic yard and a predetermined amount of mixing water.

The project described herein was a mixed-in-place job, construction being done successively on three 8-ft. lanes by traveling mechanical mixing plants. The total contract amounted to $295,890 which included grading, drainage structures, two 8-ft. compacted shoulders, cement-treated base 24 ft. wide and 6 in. thick, and a 2-in. plant-mixed bituminous surface course.

Aggregates used consisted of a sand-gravel with the following sieve analysis: All material passing a 2-in. sieve; approximately 91 percent passing a 1-in. sieve; 55 percent passing a No. 4 sieve; and from 5 to 10 percent passing the No. 100.

To determine the proper cement content, 4-in. diameter specimens 4 in. long with cement contents of both 6 and 8 percent by dry weight of the aggregate were molded in the laboratory. The 8-percent specimens yielded average compressive strengths of 1,889 psi at 28 days; the average compacted dry weight per cubic foot was 137.1 lb., and the basic water content of the laboratory specimens was found to be approximately 6 percent.

Method of construction

First step in the construction of the cement-treated base was spreading the aggregate the full width of the roadway including shoulders (40 ft.) to a depth sufficient to assure a com-

pacted thickness of 6 in. Shoulders were not treated. All aggregates were spread for the entire 7.6 miles before treatment began.

For the first day's work treatment was restricted arbitrarily to a section 2,350 ft. in length in order to acquaint the working force with the construction procedure which centered about the use of traveling mechanical mixing plants. The contractor was soon able to process as much as 18,000 sq. yd. in a day. This is the equivalent of 6,750 ft. of 24-ft. roadway.

Mixing equipment consisted of a commercially manufactured pugmill mounted on a motor patrol. Three such units were used. Mixing spools on the pugmill were driven by separate power units. Material was picked up in the pugmill, which was swung under the grader frame, and then forced back into the revolving spools to which the mixing paddles were welded. Mixed material was forced out the rear of the mixing box in a uniform flat-topped windrow.

Each mixer was equipped with a spray bar, water meter and pump. Water was pumped through a flexible hose connecting the mixer with supply tanks traveling along with the mixer. Water was injected uniformly into the mix at a predetermined rate.

Cement in sacks was trucked to the job from railroad cars on a nearby siding and spotted on the roadway in three rows 8 ft. apart. Sacks were spaced 2.4 ft. apart longitudinally, that being the proper spacing for an approximate mix of three sacks of portland cement per cubic yard of compacted mixture. The sacks were then opened and cement was dumped on the spread aggregate.

While cement was being placed, two motor patrols shaped the shoulder material at the left into a windrow with one pass, the right shoulder being windrowed on the return trip. Patrols then successively windrowed the left 8-ft. construction lane, the center lane, and the right-hand lane.

Water was then incorporated into the left shoulder by means of the traveling plant. In the meantime motor patrols were windrowing the cement-treated base materials. As this latter operation was completed on successive 8-ft. treated-base lanes, dry aggregate and cement were mixed by one of the traveling plants, which operated at about 60 ft. per minute.

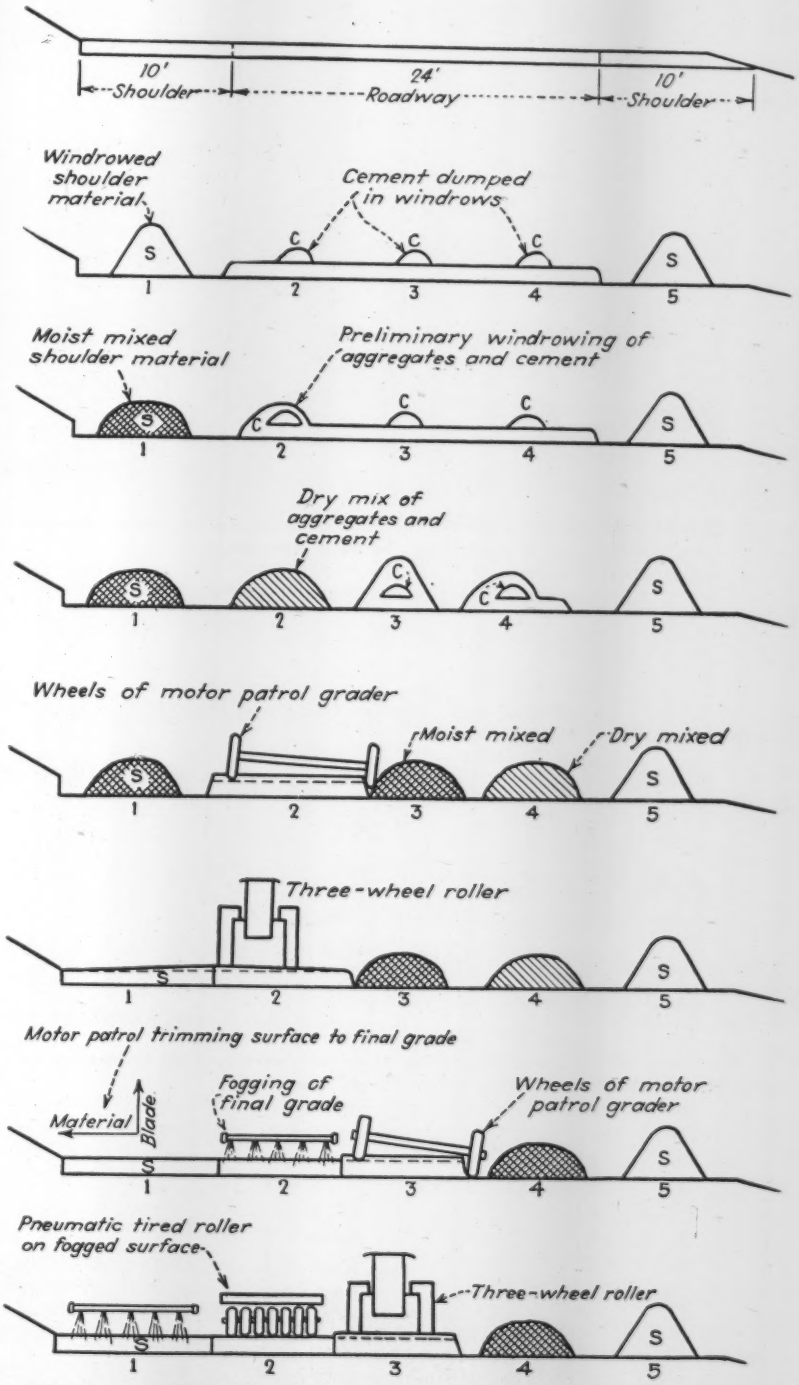


Fig. 2. Diagrammatic outline of the methods followed in processing the cement stabilized pavement base and the shoulders.

Water was then added by the second traveling plant, and the third plant completed the wet mixing. After the first 8-ft. lane had been wet-mixed, the three plants turned around and performed the same progressive steps, first on the center lane and then on the right-hand lane.

A blade grader followed immediately behind the third traveling plant in each lane, spreading moist material for compacting.

After the left-hand cement-treated-base lane was spread, one patrol grader levelled the damp shoulder material against the treated-base lane

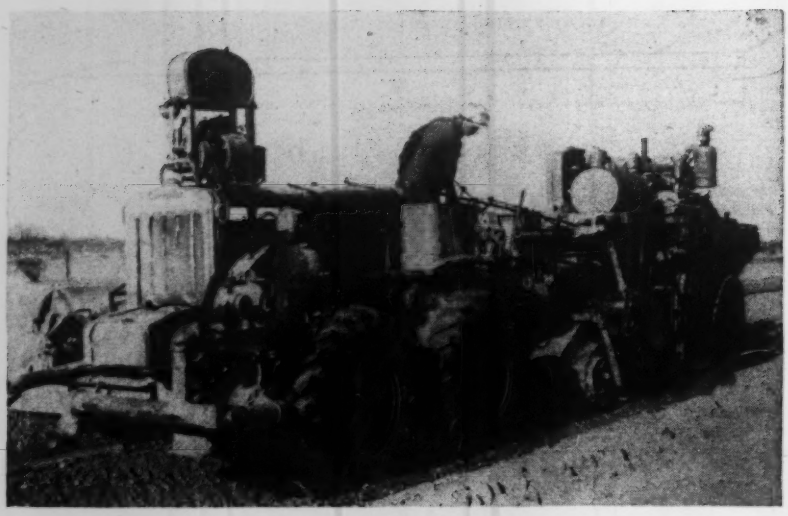


Fig. 3. The mixing equipment consisted of pugmills mounted on motor patrols. Three such units were used in processing the base material.

Fig. 4. In advance of the processing, sacks of cement were spotted in three rows 8 ft. apart, individual sacks being about 2½ ft. apart.

previously spread. Compaction of the shoulder and adjoining lane was started immediately after shoulder material had been spread. Blading and compacting of the other 8-ft. lanes and the right-hand shoulder followed in order.

Initial compacting was done with a 12-ton three-wheel roller making one pass. The surface was then trimmed, and the base again was rolled, this time with an 8-ton tandem roller.

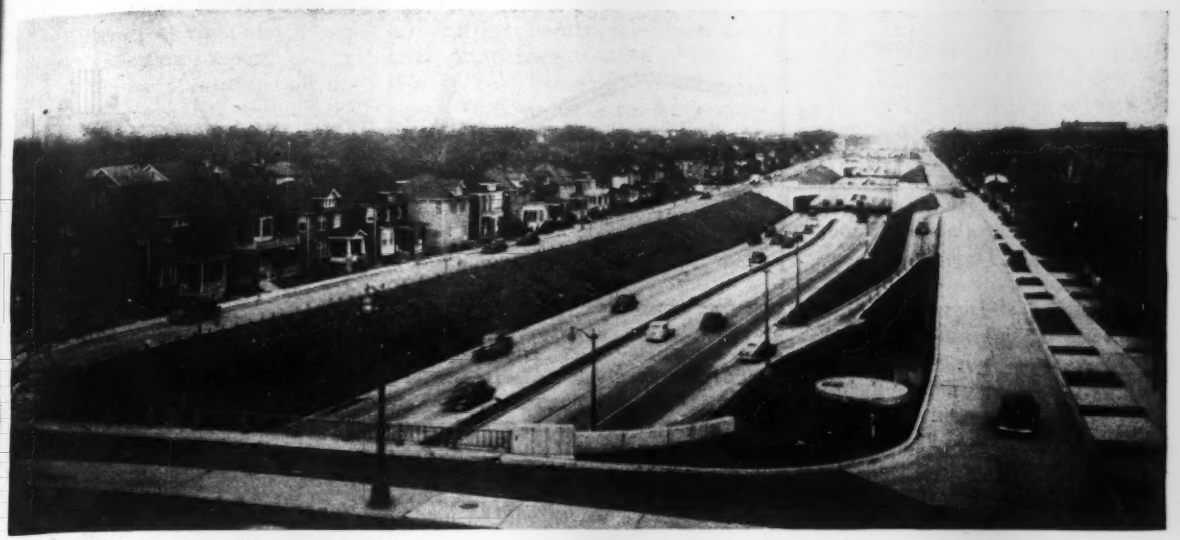
Following this operation the surface was lightly sprayed or "fogged" by a light tank truck fitted with a small centrifugal pump and spray bar with garden spray nozzles. This was done to keep the surface damp during final rolling, which was accomplished with two multi-wheel pneumatic-tired rollers. Final rolling kneaded and sealed the surface. The surface of the cement-treated base was then sprayed with emulsified asphalt as a curing seal.

Subsequently, the 2-in. plant-mix bituminous surface course was added.

Densities of the base averaged about 95 percent of that obtained in laboratory tests. Twenty-eight-day compressive strengths of the material after wet-mixing averaged 2,037 psi.

The project was built by the state highway department under the direct supervision of Cy Perkins, district engineer, with Pat Syler project engineer and James Parker resident engineer. Contract for the work was held by the L. M. White Construction Co., Don Kavanaugh being superintendent.

Fig. 5. A train type of processing was employed, each piece of equipment following the one ahead in quick order.



Designs for Detroit's proposed John C. Lodge Expressway will follow those shown here for the Davison Expressway.

Fully-Depressed Expressway Planned For Downtown Detroit

***Contents in Brief**—Planned for early construction after the war, Detroit's $50,000,000 John C. Lodge Expressway will be fully depressed throughout its entire 12-mile length. First section to be constructed will intersect the proposed Crosstown Expressway to funnel traffic from the recently completed Detroit Industrial Expressway into the city's downtown business district.*

POSITIVE RELIEF for Detroit's downdown street traffic, badly congested before the war and promising to become even more so after the war, will become a reality upon completion of the proposed John C. Lodge Expressway. For the past several months extensive studies have been underway to determine the most suitable location and type of design for this 12-mile, limited-access expressway, estimated to cost $50,000,000.

Agreements on the final location and a preliminary detailed estimate of the first 3½-miles of expressway scheduled for construction in the downtown area are expected to be completed early in 1945. Design plans then will be completed and the right-of-way secured for this section. Actual construction is expected to get under way late in 1945 or early in 1946. An estimated $20,000,000 will be required for purchasing right-of-way for the entire 12-mile length of expressway, while design plans and physical construction will cost in the neighborhood of $30,000,000.

Present plans are to originate the expressway at Jefferson Ave. and Second Ave. in the downtown business district. It will pass beneath all major streets, crossing Michigan Ave. between Fifth and Sixth streets and continuing in a northwesterly direction through the westerly business district, crossing the proposed Harper-McGraw Crosstown Expressway. From this point it will bear west to connect with the James Couzens and Schoolcraft super-highways.

Original studies contemplated elevated construction starting near the Detroit River, running northwest slightly east of the present route and terminating north of Grand River Ave. where a depressed section was to start. This scheme involved double-deck construction in the downtown area followed by one half mile of single-deck elevated structure, with the remainder being fully depressed. Chief virtues of this plan were that it would minimize disruption of the existing street pattern and disturbance of complicated underground facilities, avoid closure of certain downtown streets and utilize a minimum width of expensive right-of-way.

Elevated layout abandoned

The elevated layout was abandoned, however, despite its several functional advantages, in favor of the adopted fully-depressed section which is generally recognized as being more pleasing in appearance although it involves greater disruption of existing facilities. Then, too, there is a general public antipathy to elevated construction. By shifting the originally proposed downtown location a short distance to the west, all necessary street closures could be made at no great inconvenience to anyone and utility disruption could be minimized,

thereby making depressed construction feasible.

Profiting by past experiences in developing and constructing the 7,000-ft. long depressed Davison Expressway, completed in 1942, engineers of the Wayne County Road Commission, designers of the John C. Lodge Expressway, plan to incorporate in its design the latest methods of handling traffic. Traffic will be collected from and unloaded into the business district of Detroit by three sets of ramps feeding into Abbot and Howard streets, Bagley Ave., and Temple Ave. In addition, Jefferson Ave. itself, at the point where the Lodge Expressway enters it, will serve as a loading and unloading plaza.

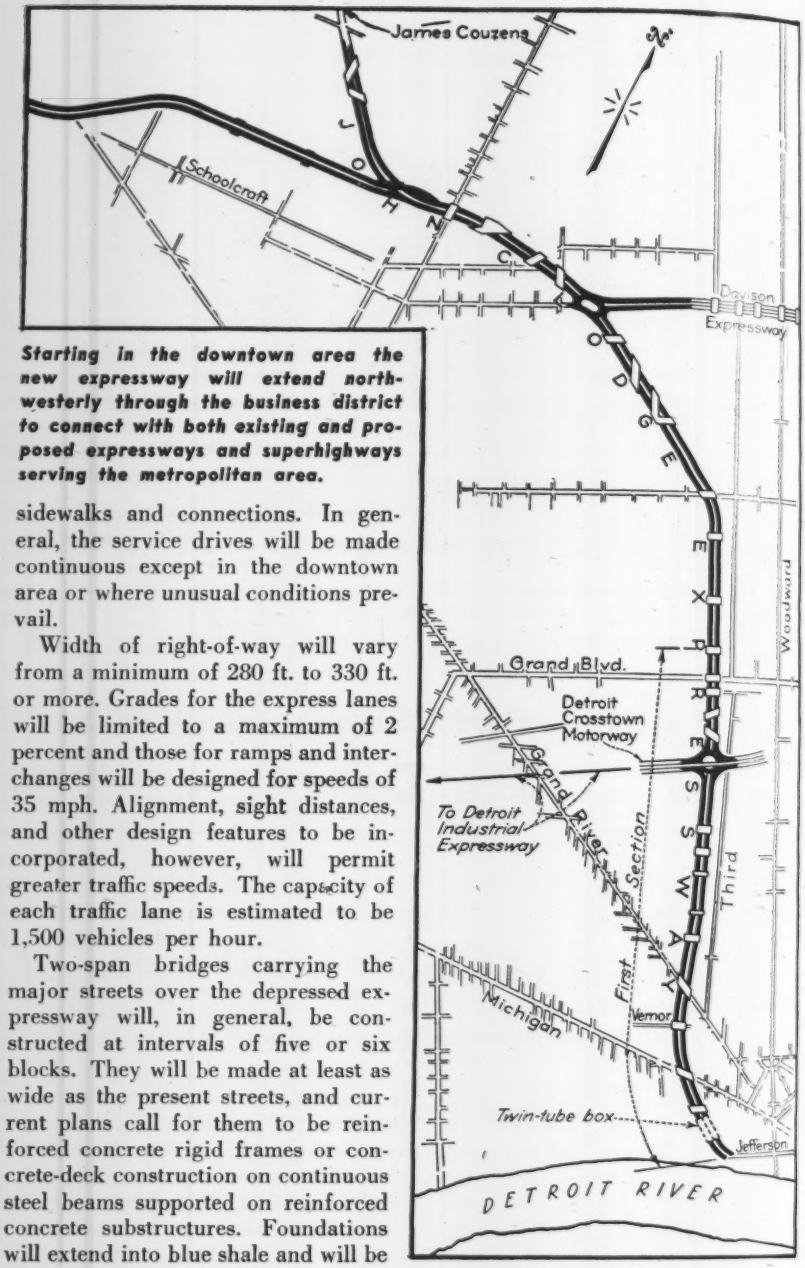
Although the present plan is to have traffic to and from the expressway enter and leave the business district over Jefferson Ave., designs for the layout of this terminus will be such as to permit future extension of the expresway through a proposed extensive development near this location with a minimum of alterations. Also contemplated is a turn-back connection with the proposed Hastings Expressway to be located east of, and parallel to, Woodward Ave.

Details of the design

The John C. Lodge Expressway will provide three 12-ft. traffic lanes in each direction separated by a 12-ft. median throughout the entire length. The right-of-way that is being acquired will be wide enough to make the use of retaining walls unnecessary in the depressed section. Except for a short stretch of closed reinforced concrete tube in the downtown area, the highway will be in open cut with banks sloped a minimum of 1 on 2 from the depressed section to ground line. Cut banks will be sodded and landscaped for erosion control and appearance.

The toe of slope will be set back 10 ft. from edge of pavement to provide emergency parking for distressed vehicles and space for snow storage throughout the entire length of depressed highway except at bridge crossings, where both the toe of slope and front face of abutment will be 16½ ft. from the pavement edge to permit future changes or expansion.

One-way service drives, or header streets, will be paved 30 ft. wide at ground level along each side of the expressway, together with suitable sidewalks and connections. In general, the service drives will be made continuous except in the downtown area or where unusual conditions prevail.



Starting in the downtown area the new expressway will extend northwesterly through the business district to connect with both existing and proposed expressways and superhighways serving the metropolitan area.

Width of right-of-way will vary from a minimum of 280 ft. to 330 ft. or more. Grades for the express lanes will be limited to a maximum of 2 percent and those for ramps and interchanges will be designed for speeds of 35 mph. Alignment, sight distances, and other design features to be incorporated, however, will permit greater traffic speeds. The capacity of each traffic lane is estimated to be 1,500 vehicles per hour.

Two-span bridges carrying the major streets over the depressed expressway will, in general, be constructed at intervals of five or six blocks. They will be made at least as wide as the present streets, and current plans call for them to be reinforced concrete rigid frames or concrete-deck construction on continuous steel beams supported on reinforced concrete substructures. Foundations will extend into blue shale and will be supported on piling or spread footings as dictated by shear values determined from soil tests now being made.

An 18,000-psi. working stress will be used in designing structural steel and 1,000-psi. for concrete based on a 3,000-psi. ultimate compressive strength at 28 days. All bridges will be designed for an H-20, S-16 live load in accordance with the A.A.S.H.O. specifications, and those carrying street car tracks also will be designed for a 40-ton freight car loading.

An extra traffic lane will be provided outside of the sidewalk area on certain bridges to permit U-turns by traffic between the one-way drives. Thus such turns can be made without entering the cross-street.

The first section of the expressway, scheduled for construction as soon after the war as materials and federal aid become available, all right-of-way has been secured, and detailed plans and estimates have been prepared, extends from Jefferson Ave. to Bethune St., about 2,000 ft. beyond the intersection with the Crosstown Expressway on Harper and McGraw avenues. Construction of this section

is estimated to cost $20,000,000 including all costs of right-of-way and damages to abutting property.

One of the early construction operations will necessarily include the relocation of existing public and privately owned service facilities located within the construction area, which must be kept in continuous service. To this end the designing engineers have submitted the proposed route for Section I, showing the facilities to be moved, to all parties concerned in order to expedite the project.

Existing sewer lines, low-pressure and high-pressure water mains within the area of excavation will cross beneath the express lanes in some cases, while in others, collector or distribution mains will be provided on each side of the cut. Included in this work will be the relocation of 2,200 ft. of 48-in. water main and 2,000 ft. of 36-in. sewer lines now located in Sixth Ave. Pumping stations will be provided as necessary to discharge storm-water falling in the open cut to the city's sewers.

As would be expected in any street improvement of this magnitude located within a highly developed business district, there will be many right-of-way and abuttal problems. Chief among these is the preservation of the existing street surface area and underground facilities at the intersection of Third and Fort streets. An open cut would be impractical at this location due to the proximity of the Union Station on one side and the Detroit News building on the other.

In view of these restrictive factors, the expressway will be carried through a twin-tube reinforced concrete box passing 6-ft. below the surface of Fort Street. Each tube will have a 40-ft. width of roadway and a 14-ft. minimum vertical clearance. A 2½-ft. wide safety sidewalk will be provided each side of the two roadways. An open cut will carry the six express lanes from the south end of the concrete box up to ground level at Jefferson Ave.

Underpinning of existing buildings

Present studies indicate that any final route chosen will present real engineering problems to the designers because several large buildings may have to be underpinned to permit the passage of the twin-tube concrete box. Tentative plans contemplate supporting one building on a network of heavy steel girders spaning the 103-ft. wide concrete box and supported on reinforced concrete substructures.

One route being considered would require that an interesting old church of Gothic design be either moved or carefully torn down and reconstructed in a new location.

Other substructure work in this area may involve the underpinning of portions of buildings due to their proximity to the reinforced concrete box structure carrying the six expressway lanes, excavation for which will extend 28 ft. below ground level into soft blue clay.

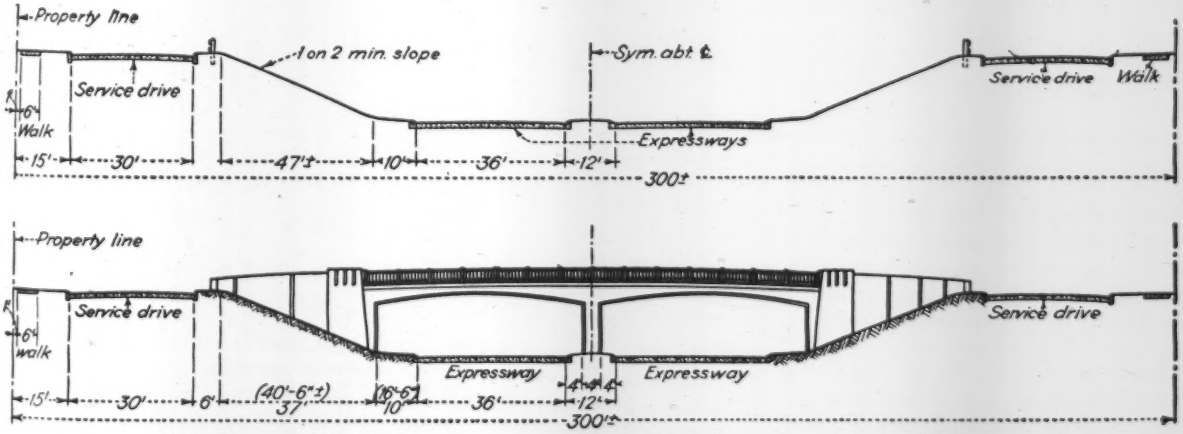
Of primary importance in the expressway design is the manner in which traffic will have access to and egress from the main traffic lanes at the three downtown ramp locations. No particular problem is presented at the terminus on Jefferson Ave. since the full capacity of the expressway is available and is accommodated by this street, which is paved 80 ft. in width.

The first ramp layout will have an outlet ramp feeding into Howard St., five blocks north of Jefferson Ave. and an inlet ramp from Abbott St., one block further north. Neither of these streets is wide enough to accommodate traffic from both ramps. A $100,000 bridge will be required to carry Howard St. over the expressway.

In general, all major outlet ramps from the depressed expressway will be paved 26 ft. wide for two traffic lanes, while inlet ramps will carry a 16-ft. pavement for one traffic lane although the graded width will be sufficient for future widening of the concrete to carry two lanes, should that ever become necessary.

The design principle behind this difference in pavement width lies in the fact that an outlet ramp discharges highspeed expressway traffic onto a lowspeed surface street, thus requiring additional moving storage throughout the length of the ramp. On the other hand an inlet ramp discharges low-speed surface traffic into the outer lane of the expressway, requiring only one traffic lane in the interest of safety to merging traffic. Any temporary moving storage required at the top of the access ramp will be provided by the surface street.

When lengths of ramps are not restricted, those permitting access to the express lanes will be limited to a



Dual concrete pavements carrying three traffic lanes each in the depressed open cut (at top) will be flanked on each side by service drives and concrete sidewalks. At bridge openings the shoulder width is increased to meet possible future requirements.

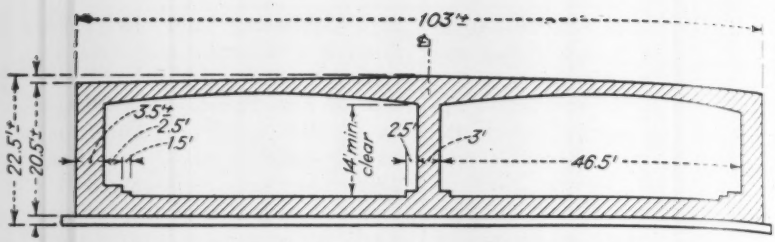
4 percent grade while a grade not to exceed 3 percent will be used for outlet ramps. This difference in ramp grades is based on principles similar to those affecting the width of ramp pavement; down-grade traffic merging with high-speed express traffic can operate on steeper grades than can outlet traffic flowing into slow-moving surface-street traffic. All grades on the express lanes will be limited to a maximum of 2 percent.

Special ramp provisions will be required where the expressway crosses under Michigan Ave., about four blocks north of Howard St. It is not desirable to discharge express traffic into Michigan Ave. since this 90-ft. wide pavement already carries a considerable amount of vehicle traffic in addition to two street car tracks. Moreover, a considerable amount of express traffic will enter into and be discharged from the expressway at this location enroute to the very heart of Detroit's downtown business district.

Ramps to have ample capacities

Present plans are to provide ramps about three blocks long connecting to 30-ft. wide service pavements which will parallel Michigan Ave. but feed into Bagley Ave. about two blocks east of the expressway. Both the service drives and the long ramps will provide ample moving storage for traffic at this location. The outlet service drive will be carried on a separate bridge just north of the sidewalk area of the proposed bridge required to carry Michigan Ave. traffic over the expressway. Bagley Ave. will be discontinued across Michigan Ave., making the easterly section a closed inlet and outlet for the ramps at this location.

A bridge will be required where the expressway passes under Vernor Highway, five blocks north of Michigan Ave., and a bridge will be needed at the Grand River Ave. crossing, located five blocks farther north. No ramps will be provided to Vernor Highway but provisions will be made for a pair of ramps between Vernor and Grand River to serve Grand River and Jefferson traffic that wishes to by-pass the business district. Ramps north of Grand River will be similar to the ones leading to Bagley Ave. except the express traffic will be received from and discharge into both Grand River and Temple avenues,



Express lanes will be carried in a twin-tube concrete box to preserve an important industrial downtown area.

which intersect at this point.

Present plans provide for bridge crossings at Stimson St., Forest and Warren avenues. Pedestrian overheads also are planned at Selden and Canfield avenues. No preliminary layouts have been made to date for structures north of Warren Ave., but the general plan contemplates some 16 additional bridges to carry existing streets over the expressway between its junction with the James Couzens superhighway and Warren Ave.

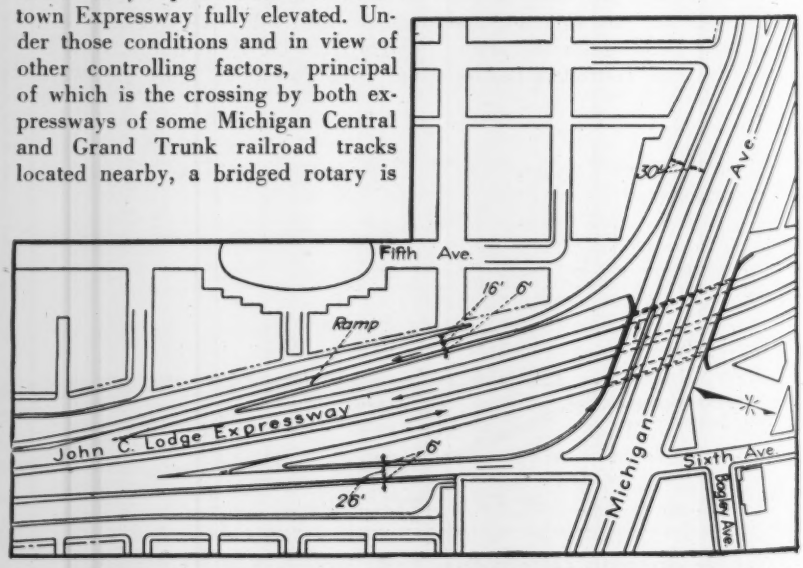
One of the most intricate design problems connected with the John C. Lodge Expressway is that of a traffic interchange where it crosses the proposed Crosstown Expressway on Harper and McGraw avenues about 2¾ miles north of Jefferson Ave.

Several plans have been considered for this interchange, which is being designed by the Michigan State Highway Department. The most favored plan to date contemplates that at this point the John C. Lodge Expressway will be fully depressed and the Crosstown Expressway fully elevated. Under those conditions and in view of other controlling factors, principal of which is the crossing by both expressways of some Michigan Central and Grand Trunk railroad tracks located nearby, a bridged rotary is contemplated at ground level to carry interchange traffic over the one expressway and under the other.

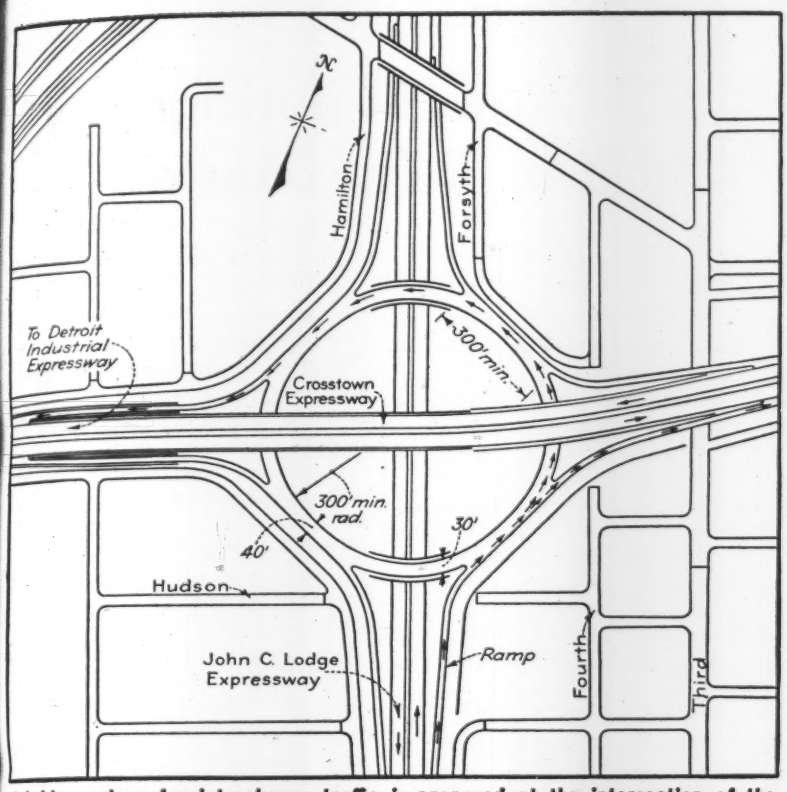
Local traffic will be excluded from this interchange and the through traffic on each expressway will pass unimpeded through the center of the interchange.

The bridged rotary will carry a 30-ft. reinforced concrete pavement except where ramp and rotary traffic merge. Here, the pavement will be 40-ft. wide to avoid the necessity for right-turn traffic entering the 30-ft. area reserved for rotary traffic. Thus, except for this right-turn lane the only traffic using the rotary will be vehicles engaged in making left turns. It is estimated that the total turning traffic will be less than one-third of the expressway traffic.

Traffic interference in such a layout will occur only at the point of merging of left turns from opposite quadrants. The merging or weaving distance at these points will be 300 ft. Present plans are to build the pave-



Long ramps of ample width and easy grades will provide safe and efficient access and egress for express traffic adjacent to Michigan Ave. bridge crossing.



A bridge rotary for interchange traffic is proposed at the intersection of the John C. Lodge Expressway and the Crosstown Expressway.

ment centerline of the bridged rotary on minimum radii of 315 ft. and maximum of 525 ft.

The expressway is named in honor of John C. Lodge, president of the Common Council of Detroit, ex-mayor of that city and widely respected for his scholarly statesmanship during the past 40 years of public service to Detroit as well as his policy of always standing squarely behind the recommendations of his engineers.

Coincident with the preparation of preliminary plans for the John C. Lodge Expressway by the Wayne County engineers, the Michigan State Highway Department has been making similar investigations for the proposed Crosstown Expressway. Involving both depressed and single-deck elevated construction, the Crosstown Expressway will join the recently completed Detroit Industrial Expressway (*ENR* Oct. 5, vol. p. 409 and Oct. 19, vol. p. 485) at its junction with Michigan Ave. on the west edge of Detroit and continue northeasterly across the city approximately on the line of Harper and McGraw avenues to Eight Mile Road.

Early in 1944 a tripartite agreement was negotiated between the Wayne County Road Commission, the Michigan State Highway Department and the city of Detroit to expedite a comprehensive plan for expressways within the Detroit Metropolitan area.

It early became apparent that the greatest benefit to traffic would result from constructing the $2\frac{3}{4}$-mile length (Section I) of the John C. Lodge Expressway extending from its southern terminus to the bridged rotary at the intersection with the Crosstown Expressway and the $4\frac{1}{2}$-mile length (Section I) of the Crosstown Expressway beginning at its junction with the Detroit Industrial Expressway and ending at the same intersection. This will give a free flow of traffic from the heavily traveled Detroit Industrial Expressway directly into downtown Detroit.

In accordance with the agreement, design plans for both expressways are subject to approval by all three parties. Both expressways have received the status of federal-aid construction and all funds necessary for matching federal monies for surveys, plans, specifications and physical construction will be met in the ratio of one-half by the Michigan State Highway Department and one-quarter each by Wayne County and the city.

The costs of property acquisition for right-of-way, including abuttal damages will be met by the three parties in the same ratio. All right-of-way is being secured by condemnation proceedings. Annual contributions of $3,000,000 by the State Highway Department and of $1,500,000 each by the County Road Commission and the city of Detroit have been provided for.

Since 1942, a total of $510,000 has been budgeted by the Wayne County Road Commission for planning and $2,672,500 has been set aside to be applied to the John C. Lodge Expressway.

Because of the magnitude of both projects and the unavoidable time element involved in financing and construction, the tripartite agreement stipulates that neither acquisition of right-of-way nor construction shall proceed beyond Section I of either expressway at the expense of joint funds, until Section I of the other highway has been completed or funds committed for its completion.

Planning personnel

All planning of both expressways has been greatly expedited by the close cooperation and untiring efforts of a special planning committee appointed by Leroy C. Smith, county highway engineer, Wayne County, Mich. Included in this committee are: Harry A. Shuptrine, engineer of bridges and structures, Wayne Co.; Harry C. Coons, deputy commissioner-chief engineer, Michigan State Highway Dept., who also has direct supervision of the preparation of plans for the Crosstown Expressway.

Other committee members include Glen C. Richards, commissioner of the department of public works, Geo. R. Thompson, city engineer and Lloyd B. Reid, city traffic engineer—all of the City of Detroit; L. P. Scott, senior highway engineer, Bureau of Public Roads, Chicago; L. R. Wagner, superintendent of engineering, department of street railways; and G. F. Emery, city planner and secretary, Detroit City Plan Commission.

Plans for the John C. Lodge Expressway are being prepared under the direct supervision of Mr. Shuptrine. Julian C. Mead is engineer of the County Road Commission and F. H. Chapin is chief draftsman.

Louisiana Plans a Postwar Superhighway To Carry Traffic Past Lake Charles

***Contents in Brief**—Business study of the industries and export trade of Lake Charles, La., and of the tributary crop and oil-producing areas justifies increased highway facilities. Traffic counts and flow-maps indicate existing congestion and long routing and their decisive correction by a new by-pass and cut-off highway. Plans and costs are given of a four-lane limited-access highway including a 3½-million dollar high-level bridge.*

A SUPERHIGHWAY, costing 12½-million-dollar, to serve the city of Lake Charles and complete a 26.35 mi. section of the east and west Interregional Highway from New Orleans, La., to Houston, Tex., ranks high among post-war construction operations for which plans have been developed by the Louisiana Department of Highways. Included in the new construction and estimated to cost about 3¼-million dollars is a high-level highway bridge which is a notable project in itself. All parts of the plans, a four-lane paved highway, parallel service roads, grade separations, traffic interchange points and type of bridge, were based on studies of regional production and city industrial growth and particularly on a careful survey of present and possible future intercity and bypassing through traffic. The details of these surveys over-run any reasonable article space but they were many and were carefully thought out, especially in respect to future traffic estimates.

As shown by the airplane view, Fig. 1, the city of Lake Charles is located on the east and south shores of Lake Charles, formed by the Calcasieu River, which is both the source of the lake and its outlet to the Gulf of Mexico. The trade territory tributary to the city extends about 50 mi. east, 40 mi. west and 80 mi. north. This is a rich agricultural area producing large quantities of rice, cotton and garden truck and providing grazing range for large herds of livestock. Lake Charles is the natural market outlet for these products by ships down the Calcasieu River to the Gulf and hence to outside markets. Much of the the territory is also in the coastal oil area and the bulk of the oil moves by rail or pipeline to Lake Charles where it is refined and shipped by tankers. Careful production studies were made, as part of the highway study.

Growth of Lake Charles as a port led Congress to make an appropriation of $9,300,000 to construct a shorter channel to the Gulf. Construction was begun in 1939 and the channel was opened for traffic in July, 1941. It is a ship canal 250 ft. wide and 30 ft. deep, is adequately lighted and shortens the sailing distance to the Gulf to 33 mi. Industries were already centering in the city, but with the improved port facilities and due to the war this development increased, particularly in the oil business. As of July 1941 the tank farms owned by six companies had a capacity of 8,344,000 bbl., and just before the war some 25,000,000 bbl. of oil moved through the channel annually.

A close second to the oil interests in plant investment is the $75,000,000 Mathieson chemical works producing caustic soda, soda ash, magnesium and ammonia. The location of these and the various petroleum-products plants are shown on Fig. 2 in relation to the planned new road. Together these companies have a payroll of about 6,000 and are building some 1,200 houses in two housing projects (Fig. 2) to provide needed homes. Before the accession of these new industries both the city and the parish (county) had shown an increase in population of about 35 percent between 1930 and 1940 and growth was being maintained.

These general particulars of city and regional development have significance because the city street and the tributary highway routing remain

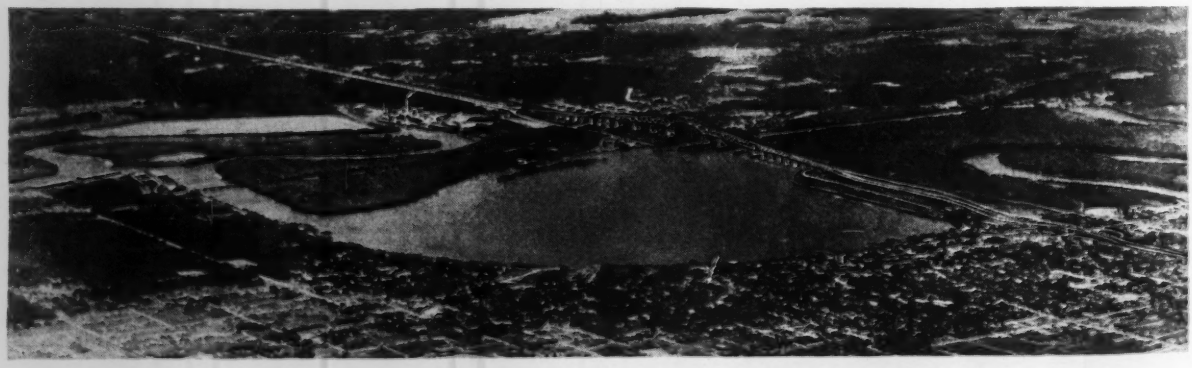


Fig. 1. Airplane view of Lake Charles, rapidly growing Louisiana Gulf port, showing location of by-pass highway to reduce traffic congestion and long routing.

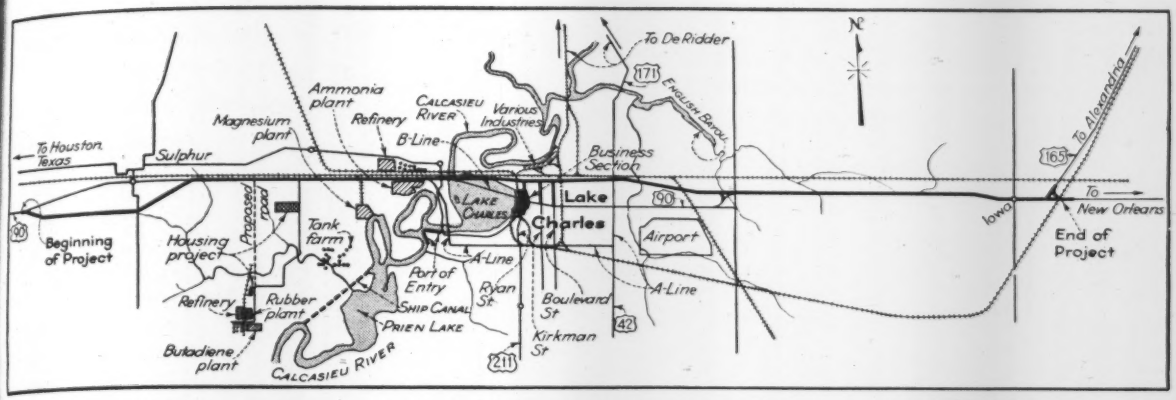


Fig. 2. The proposed Lake Charles, La., by-pass highway, shown as a heavy line, clears the congested business section and growing industrial-plant area just close enough to permit easy street-traffic interchange.

the same as before Lake Charles had reached any such great port and industrial importance as it now has. Therefore the development study was carried to many details, not practicable of ennumeration here, but necessary to establish justification for a post-war highway improvement of major size. With testimony for improvement beyond reasonable doubt, analysis of traffic conditions and changes was a following step.

Present highway service

The main highways serving the Lake Charles region are indicated on Fig. 2. They are U. S. highways 90, 165 and 171, and state roads 42, 211 and 382. Of these U. S. 90 (Old Spanish Trail) is the most important. It will be noted from the map how all other roads enter the city proper by this route. Also to be noted is that in leaving the city to the west, U. S. 90 swings south and then north around the lake shore and crosses a bridge over the Calcasieu River. This bridge of old construction, only 20 ft. wide, without sidewalks and having to be opened some ten times a day for navigation forms a definite bottleneck. Other traffic restrictions on the route are inadequate pavement width, right-angle turns, sharp curves, intersecting streets and traffic lights in the business section.

The traffic count and flow map, Fig. 3, emphasizes the restrictions indicated. All traffic from the east and north focuses in a congested business district. To the west out of the city it has a long and crooked detour around the south and west shores of the lake. Traffic from the west meets these obstacles in reverse order. In either direction traffic encounters bottleneck at the Calcasieu River bridge, traffic through which has increased over 182 percent in ten years. Briefly, all present traffic flow is to congestion points and longer routes. A correction of this is the general problem to be solved and the solution worked out involves as radical a change of city traffic flow as is often attempted. This is shown by the count and flow map, Fig. 3, of traffic as it is expected to reroute itself.

As shown in Fig. 2, a new by-pass and cut-off highway is planned. The new route, east and west of Lake Charles, follows U. S. 90, but at the city it swings north of city and lake and cuts off the direct entrance into the city of the present route and its loop south around the lake. Between ends it is 23 percent shorter than present route U. S. 90. Its location permits a right-of-way wide enough for two parallel service roads to be secured. It affords close connection for traffic interchange with the main business streets. It is the route asked for by all city business organizations.

That no challenge of neglect to consider possible alternatives would be

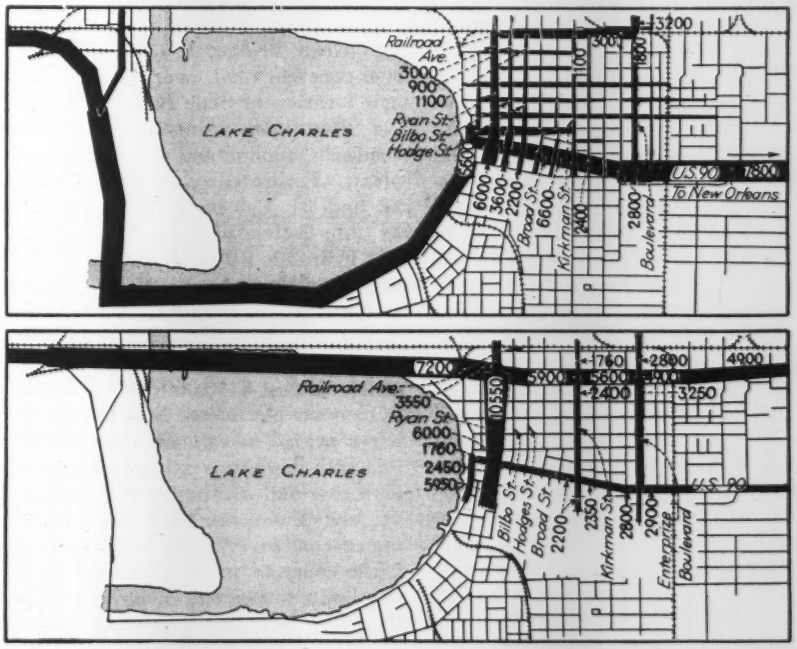


Fig. 3. Traffic flow at Lake Charles, La. The upper diagram shows the present congestion at the center of vehicle flow in the city, also the long routing of through travel. The lower diagram shows the shortened route for through traffic provided by the new highway, also the manner in which that highway will reduce congestion in the city.

risked, analyses were made of two other routes shown as Line A and Line B on Fig. 2. Neither was found to serve as well as the route chosen to put traffic into, through and out of the city with the least amount of delay and friction. Principally, each of the routes is longer than the one chosen; Line A increases the distance of approach from the business section, and Line B is through more expensive right-of-way property and calls for a longer and more costly bridge across the lake and river.

Part of interregional system

Structurally, the new road, which is planned as part of the Interregional Highway from New Orleans to Houston, keeps close to the design requirements announced for roads of limited-access class. Grade separations are provided at all present major intersections and enough right-of-way will be acquired at intersections that now are minor ones to provide for future separations of grades. Sufficient right-of-way will be secured to provide for full-length service roads. These will be constructed at once through urban sections and at other places where traffic justifies their installation. The minimum width of service roads in urban areas will be 32 ft. between curbs.

In the design of this highway a working capacity of about 10,000 vehicles a day is assumed.

The main highway will have two 24-ft. concrete roadways separated by a depressed median strip. Curves and vertical and horizontal sight distances are designed for a 75-mph. speed on rural sections and a minimum speed of 50 mph. on urban sections. Main intersections will be grade separations of the clover-leaf type designed for a minimum speed of 30 mph. Other provisions common to roads of this type, such as off-roadway bus stops, acceleration and deceleration strips and service-road sidewalks, are provided. Entrances to bus stops are only from the service roads and in all other respects the main road is designed as a limited and controlled access highway.

High-level bridge chosen

Of the total $12,410,800 estimated cost of the new highway, the Calcasieu River bridge section accounts for $3,240,700. The bridge section, including only the bridge structure proper, is 1¼ mile long. Because of its service to both river and road traffic, types and designs of structure received careful comparative study. Both high-level fixed-span and low-level bascule span designs were considered. Decision fell on the high-level design. It insures a free way at all times for both navigation and road travel. While the present 150 openings a month would not greatly discommode road travel, contemplated dock construction up-river from the bridge and constantly increasing traffic movement on river and road would occasion future objectionable delays. A low-level bridge is more liable to accidents. Finally, maintenance and operating costs are less for a high-level bridge.

A general idea of design can be had from Fig. 1. The total length of steel structure is 6,625 ft. made up of a 2,875-ft. west and a 2,180-ft. east approach of plate girders on steel bents and of 1,570 ft. of truss spans, with a center river span clearance of 135 ft. above maximum high water. The steel structure has two 26-ft separated roadways and two sidewalks.

Construction plan and cost

For construction purposes it is proposed to divide the road into seven sections as follows: (1) From west end of project (Fig. 2) to the Calcasieu River bridge, 10½ mi. of four-lane concrete road, overpasses at the new location of State Route 382 and the Mathieson plants and service roads at Sulphur and the Mathieson plants. Estimated cost $1,865,600; (2 and 3) Calcasieu River bridge, 1¼ mi., estimated cost $3,240,700; (4) hydraulic fill and 1,100 ft. of sea wall from the Calcasieu River bridge to the Ryan St. overpass, 1 mi., estimated cost $744,700; (5) overpass at railway and Ryan St., 0.3 mi., estimated cost $450,000; (6) two 24-ft. concrete pavements from Calcasieu River bridge to east city limits, 2.4 mi. with high-type service road on each side and overpasses at Kirkman St. and Enterprise Boulevard, estimated cost $1,792,800, and (7) two 24-ft. concrete pavements from east city limits to east end of project, 11.9 mi., with overpasses at U. S. highways 165 and 171, estimated cost $1,632,000.

Added up, these seven construction operations total 26.35 mi. of highway and an estimated cost of $12,410,800. The total cost is divided as $9,725,800 for construction and $2,685,000 for right-of-way.

Argument for improvement

The primary purpose of the projected Interregional Highway System announced by the Public Roads Administration being to serve the greatest volume of traffic without deviating too far from a straight line between the primary control points, it is urged by the Department of Highways that the construction described should become a part of the future Interregional Highway System contemplated for southern Louisiana. Lake Charles is a city and shipping port of importance, and the only one, on a nearly direct line between the control points of New Orleans, La., and Houston, Tex. The new road is thus on the logical route from the standpoints of population, industries, traffic volume and alignment. Due to the present inadequate highway facilities in and near Lake Charles there must be some immediate highway improvement in this area, and particularly on U. S. highway 90, to accommodate present traffic.

D. V. Smith is director of highways in Louisiana, Harry B. Henderlite is chief engineer, and I. L. Thomas, Jr., is traffic and planning engineer.

$18 Billion for Roads And Streets in Decade

Total street and highway construction and maintenance expenditures for the 10-year period, 1933-42, amounted to $17,754,000,000, according to the United States Public Roads Administration.

Construction costs totaled $8,190,000,000, with the federal government supplying $2,160,000,000, the states $3,030,000,000 and $3,000,000,000 spent by counties, cities and towns.

Maintenance costs of roads and streets for the decade amounted to $5,365,000,000 with the states spending $1,931,000,000; counties, cities and towns $3,434,000,000 and federal work relief $4,199,000,000.

Expenditures by years on street and highway construction and maintenance by all agencies were:

1933—$1,110,000,000	1938—$2,177,000,000
1934—$1,554,000,000	1939—$2,173,000,000
1935—$1,290,000,000	1940—$2,110,000,000
1936—$2,022,000,000	1941—$2,026,000,000
1937—$1,824,000,000	1942—$1,468,000,000

The old pavement on Route 29 near Atlanta was narrow and badly broken in many places due to inadequate foundation.

Modernization of an Old Concrete Pavement

***Contents in Brief**—To widen and improve the riding qualities of an old 18-ft. concrete pavement on a heavily traveled highway in Georgia, the badly damaged areas were replaced with soil-cement construction, the pavement made wider by adding a 2½-ft. wide soil-cement section along each side, and the old and new construction surfaced with a 1-in. asphaltic-concrete leveling course, followed by a 1½-in. binder course and a ¾-in. wearing course. Plant-mix operations in combination with the use of special spreading and compaction equipment resulted in rapid work at reasonable cost and without the road being closed to traffic.*

REPAIR AND WIDENING of over 22 miles of old concrete pavement on Route 29 near Atlanta with soil-cement and asphaltic concrete has proved so successful that engineers of the Georgia State Highway Department early this year (1945) are planning to let contracts for modernizing by similar methods about 30 additional miles of the same highway. Contributing to this decision were the facts that the procedure followed was not considered overly costly when compared to other methods, nor was it necessary to close the highway to traffic while the work was being done.

The pavement recently repaired and widened consisted of a 9-6-9-in. thick concrete slab constructed in 1920 and providing a roadway width of but 18 ft., which had proven too narrow for modern traffic needs. Several miles of the pavement was reinforced, while the remainder was built of plain concrete. The unreinforced construction had disintegrated badly.

Several different methods of improvement were considered, including: (1) Surfacing the old concrete with asphaltic concrete without repairing the damaged areas; (2) tearing out the old slab and constructing an entirely new pavement, (3) widening the old slab with asphaltic concrete and then surfacing the entire roadway with the same material, and (4) widening the pavement with portland-cement concrete and using the same material for surfacing. All these methods were considered less satisfactory, because of cost, results that could be expected, or other reasons, than the procedure finally adopted. This method consisted of repairing the badly damaged areas of the old slab with soil-cement construction, widening the old roadway by adding 2½ ft. of soil-cement stabilization at either side, then surfacing the 22-ft. roadway with asphaltic concrete.

The badly disintegrated sections

Badly cracked areas of old concrete pavement were broken out and replaced with soil-cement compacted in place with pneumatic hand tampers.

accounted for about 5 percent of the total area of the old pavement. Investigation revealed that a soil of low bearing value directly below the slab had been a major factor in the destruction of the concrete at these points and that any successful repair method would require replacement of the upper layers of this soil with the better material. Consequently, it was decided to break up the severely damaged portions of the slab with pneumatic hammers. After the broken pavement had been removed, the undesirable material was excavated to a depth of at least 6 in. below the old slab and the resulting holes were filled to the level of the old concrete pavement with a stone-stabilized soil-cement mixture, compacted in place at optimum moisture content.

Top soil containing about 15 percent of silt and clay by weight was used for this work. To this material was added 10 percent by *volume* of ordinary portland cement and between 30 and 40 percent by *weight* of crushed granite chips or slag of 1½-in. maximum size. The materials were mixed with sufficient water to bring the mix up to optimum moisture content, about 12 percent. Both contractors mixed the materials at central plants, one contractor using a 37E dual-drum paver and the other employing an asphalt plant of the pug-mill type. Both mixing methods were satisfactory.

The soil-cement mix for the patches was transferred from the mixing plant to the desired point along the highway by end-dump trucks. Spread in layers not exceeding 4 in. in thickness, the material was compacted in place with pneumatic hand tampers.

Road remains open to traffic

Repair of the severely damaged sections was restricted to one lane of pavement at a time to permit traffic to use the other lane. Moreover, this work was not permitted to advance too far ahead of the surfacing operations. To reduce possible damage to the patches before the slab could be surfaced, they were kept covered with about 3 in. of natural earth, this soil providing a satisfactory method for curing.

For the widening work, the contractor was given a choice of processing the original shoulder material, which contained about 30 percent of 1-in. stone or smaller, or to bring in new material. Both contractors decided that the latter method would be more satisfactory because of the narrow width being paved and because this procedure would reduce interference to traffic. Rather than attempt to mix the new material in place they chose to use the central mixing plants employed for the patching work.

The original plan of the highway department was to add only 2 ft. of new pavement along each side of the old slab. Use of outside forms was specified for this work. However, the contractors offered instead to build a 2½-ft. width at each side without the use of forms, using a special box to spread the widening material. This method was approved by the highway department.

In following out this plan, the old material was removed by a trencher cutting to the full width of 2½-ft.

TABLE I—UNIT PRICES FOR 12.35 MILES OF WORK
Scott Construction Co.

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
8-in. soil- cement work*	Sq. yd.	53,694	$0.60	$32,216
Asphalt-conc. leveling course binder or black base	Tons	3,263	5.10	16,641
Hot asphalt-concrete binder	Tons	13,031	5.10	66,458
Asphaltic conc. black base for super-elevation	Tons	886	5.10	4,518
Modified Topeka surfacing, type 2	Tons	3,985	5.22	20,801
Portland cement for soil-cement	Bbl.	4,835	3.00	14,505
Bituminous prime (coal tar) for patching	Gal.	7,410	.20	1,482
Hot, asphalt-concrete binder for patching	Tons	930	5.10	4,743
Concrete paving removed	Sq. yds.	24,704	.30	7,411
Additional stabilizer aggregate	Cu. yd.	600	5.50	3,300

Total bid including culverts and miscellaneous work, $219,560.
† Price does not include cost of cement and stone.

TABLE II—UNIT PRICES FOR 10.42 MILES OF WORK
W. L. Cobb, Inc.

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
Concrete paving removed	Sq. yd.	26,380	$0.40	$10,632
8-in. soil-cement work	Sq. yd.	47,841	.90	43,056
Stabilizer aggregate for soil-cement work	Cu. yd.	3,965	3.00	11,895
Asphaltic concrete leveling course, for binder or black base	Tons	2,835	5.45	15,450
Hot asphaltic concrete binder	Tons	12,048	5.45	65,661
Asphaltic conc. black base for super-elevation	Tons	1,442	5.45	7,858
Modified Topeka surfacing, type II	Tons	3,562	5.70	20,303
Portland cement for soil-cement work	Bbl.	4,953	2.65	13,125
Bituminous prime (coal tar) for patch	Gal.	6,175	.15	926

Total bid, including culverts and miscellaneous work, $215,434.
* Cost does not include cost of cement and stone.

Widening followed as closely behind as practical, as this method avoided a long length of open trench, which was considered a severe traffic hazard. Moreover, if a heavy rain filled the ditch with water, operations had to be suspended until the trench was dry.

The job-made spreader boxes employed to distribute the widening material cost less than $100 apiece. They were pulled by a crawler tractor operating on the old slab. Use of the boxes resulted in a uniform loose depth of 11½ in., which compacted to a depth of 8 in. The use of the boxes also resulted in a good separation between the soil-cement pavement and the natural earth shoulder.

Compaction of the widening material was by several passes of a rubber-tired tractor with one rear wheel converted into a sheepsfoot roller. This wheel traveled over the material being compacted, while those on the opposite side remained on the concrete pavement. When the wheel with the sheepsfoot teeth began to "walk out", pneumatic-tired rollers were used to complete the compaction work. Once this operation was ended, the base was covered with 3 in. of earth and sprinkled periodically for seven days. Generally, the soil-cement slabs were left a bit high to permit them to be cut down level with the top of the concrete slab by a motor grader, this work being done at least seven days after the compaction operations for a given section had been completed.

To permit the most efficient use of the equipment and to allow traffic to continue the use of the highway, the soil-cement base was built along but one side of the road at the time. A good day's progress was 3,000 ft. of 2½-ft. wide base, although as much as 5,000 ft. was built some days. Cost of the soil-cement widening, including labor, materials and placing, was $1.50 to $1.75 per sq. yd.

An important step before putting down the asphaltic concrete surfacing consisted of constructing expansion joints on 180-ft. centers. The old pavement had been built without joints, and in the modernization work it was considered necessary that they be added. In this operation paving breakers were used to cut a 2-in. wide slot in the old slab. This space was then filled to within 1 in. of the surface with a sawdust to which about 8 percent of RC3 asphalt had been added at 150 deg. F., the material being compacted in place with hand tampers.

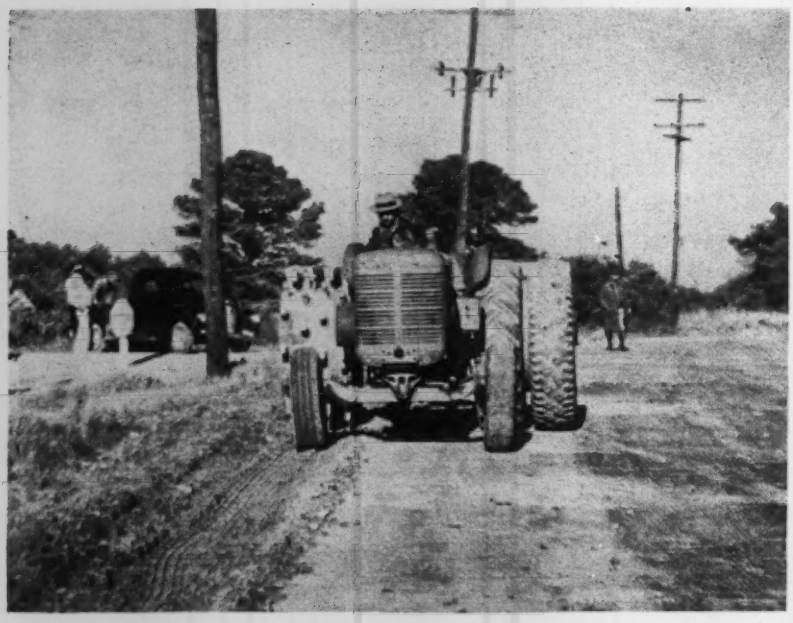
Along each edge of old concrete slab a 2½-ft. wide soil-cement base of 8-in. compacted thickness was added, the material being spread by a job-made box which permitted rapid placing of the material. These boxes confined the material to a definite zone and spread it in a uniform thickness.

The remaining inch was then filled with modified Topeka asphaltic concrete of the type used for the wearing course, which will be described later. In putting down the new surfacing, the asphaltic pavement was made continuous over the joints in the concrete. To date, little cracking of the surfacing over the joints has developed, thus the type of joint used is considered satisfactory.

Leveling course required

The original plan in adding the asphaltic concrete surfacing over the old slab and the new soil-cement construction was to put down two courses, a binder course and a wearing surface. However, experience showed that better results could be obtained if a leveling course was used before putting down the other two. Consequently, this method was followed much of the time.

Treatment of the surface to be paved included application of a tack coat consisting of 0.8 to 1.0 gal. per sq. yd. of RC8 asphalt. This material was applied at a temperature of 350 deg. F. just ahead of the leveling course. The latter was generally 1-in. thick and consisted of a plant-mix asphaltic concrete made with granite chips of which 90 to 100 percent would pass a ¾-in. screen, about 8 percent by weight of 80 to 100-penetration asphalt being used as the binder. This course was put down by a self-propelled spreader at a temperature of 250 deg. F.



Soil-cement base was compacted with a tractor equipped with a special wheel having teeth of the type used for sheepsfoot rollers.

Next, after a tack coat had been applied, a 1½-in. binder course was put down in the same manner as the leveling course and using the same materials. No tack coat was used before constructing the wearing course. The latter consisted of a ¾-in. thickness of modified Topeka asphaltic concrete with 90 to 100 percent of the granite chips passing the ½-in. screen, 80 to 100-penetration asphalt being used as the binder. This course was also put down at a temperature of 250 deg. F., and it was usually constructed within one or two days after the binder course. In the early stages of the project a ½-in. top coat was tried, but this proved too thin and the ¾-in. thickness was specified for the remainder of the work.

Asphaltic concrete was added on one-half of the roadway at a time by a self-propelled spreader. General practice was to add the wearing surface within two days after the binder had been put down.

In construction the asphaltic concrete surfacing, only one-half of the road was paved at a time, which left the remaining lane free for traffic. Following this method, one paving crew using a single spreader was able to add 1,500 ft. of the 1½-in. wearing course daily or 3,000 ft. of the ¾-in. top course. Operations continued from sunup until sundown. The mixing plants were located at a railroad siding near the center of the project, resulting in short hauls.

Work done by general contract

The operations were carried out by general contract, W. L. Cobb, Inc., Decatur, Ga., doing 10.42 miles and the Scott Construction Co., Thomasville, Ga., holding the contract for 12.35 additional miles.

Total payment to each contractor and a break down of the saving costs on a unit price basis are shown in the accompanying tables. When all costs are added, including drainage, grading, and the several other operations required in widening the roadway, the expenditure per mile totals about $19,000. This cost is considered sufficiently low by the highway department that they plan to modernize about 30 more miles of old pavement on the same route during 1945. Contracts for this work are to be let early this year.

S. P. Allison, chief construction engineer, was in general charge for the Georgia State Highway Department of which G. T. McDonald is chief engineer. W. H. Jackson is division engineer, while Ed Reed was resident engineer. The Public Roads Administration was represented by J. T. Marshall, senior highway engineer and head of the Atlanta office of the PRA.

For the Cobb firm, Velpoe Smith was general superintendent, and Dan Scott held a similar position for Scott Construction Co., which sub-contracted its share of the asphalt work to E. Jack Smith Construction Co., Atlanta.

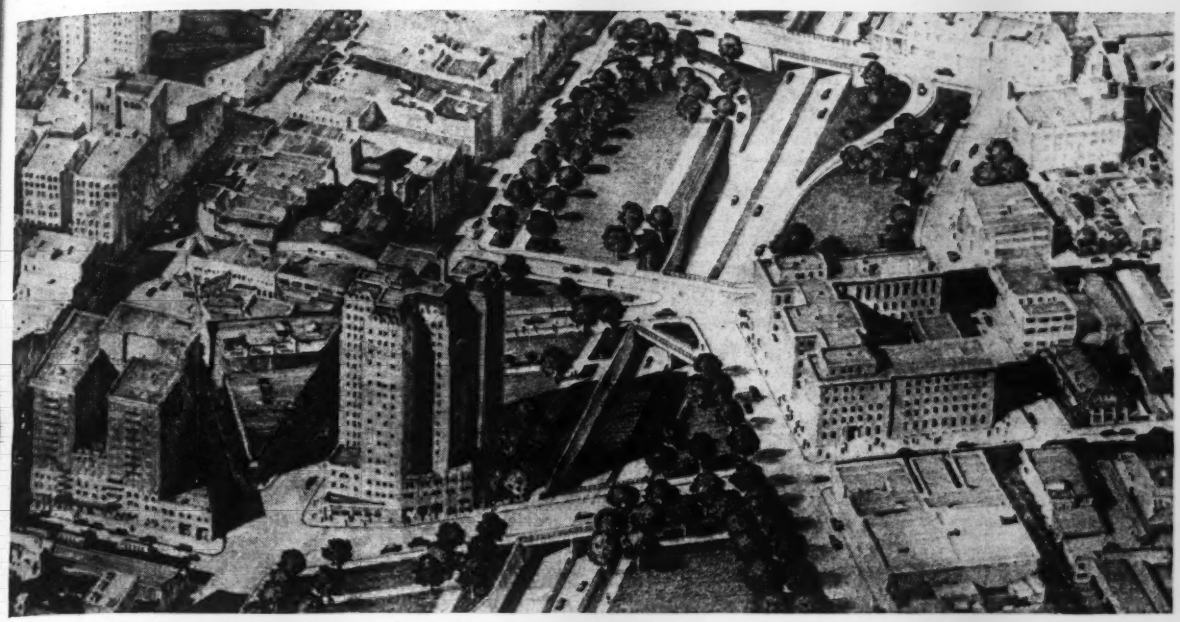


Fig. 1. The expressway generally is depressed through the cities, as shown here for the business district of Dallas.

Expressway for Dallas and Fort Worth

***Contents in Brief**—Studies for an expressway to connect Dallas and Fort Worth, Texas, and to provide better facilities for traffic in those cities have been completed. The proposed highway will provide for three lanes of traffic in each direction, only two of which will be built in the rural area between the cities. Access to the expressway is to be limited throughout its length. In each city the new highway will pass close enough to the business district to provide facilities for bus and truck service as well as for passenger cars moving to and from commercial and industrial areas.*

AN EXPRESS HIGHWAY, intended for bus and commercial as well as passenger car traffic, designed for speeds of 70 mph. in the open country and 50 mph. through the downtown areas of Dallas and Fort Worth is proposed as a five-year, $61,000,000 postwar improvement. The cost can be broken down as $45,550,000 for construction, $13,650,000 for land, and $1,800,000 for detail plans and surveys.

The proposed highway is to be of the limited-access type. Through the built-up areas of the two cities it will generally be depressed below the street level in an open cut with a right-of-way provided by taking a full block width and utilizing the existing streets for local service roads. The expressway will parallel principal thoroughfares in the cities and in the rural areas will be on an entirely new right-of-way. The project is so planned that construction will not interfere with traffic on existing routes.

The Texas Highway Department has long planned improvements to handle the heavy traffic to and through these important cities and has made some preliminary studies for such a highway. Each city also has a plan for traffic within its environs, planned to connect with the intercity facility. However, to get a completely new and objective approach, the consulting firm of Parsons, Brinckerhoff, Hogan & Macdonald of New York was retained by the state highway department to make a complete survey of the east-west traffic of the entire region and recommend a comprehensive plan for highway development. This article is concerned mainly with the survey and report made by the consulting firm.

At present the east-west traffic across north Texas and through Fort Worth and Dallas is served by U. S. Highway 80. Between Dallas and Fort Worth this highway is the heaviest traveled route between cities in Texas, carrying in 1943 an average of nearly 8,000 cars per day (the 1941 figure was more than 10,000), with more than double traffic near Dallas where the highway is used also for access to manufacturing plants. Through the cities the route is seriously congested, especially during peak hours, and travel is hampered by traffic lights, by cross traffic and left turning movements as well as by pedestrian crossings.

A route generally along the existing highway was recommended for development as a link in the Interregional Highway System proposed by the National Interregional Highway Committee in a report that was transmitted to the Congress by the President in January, 1944.

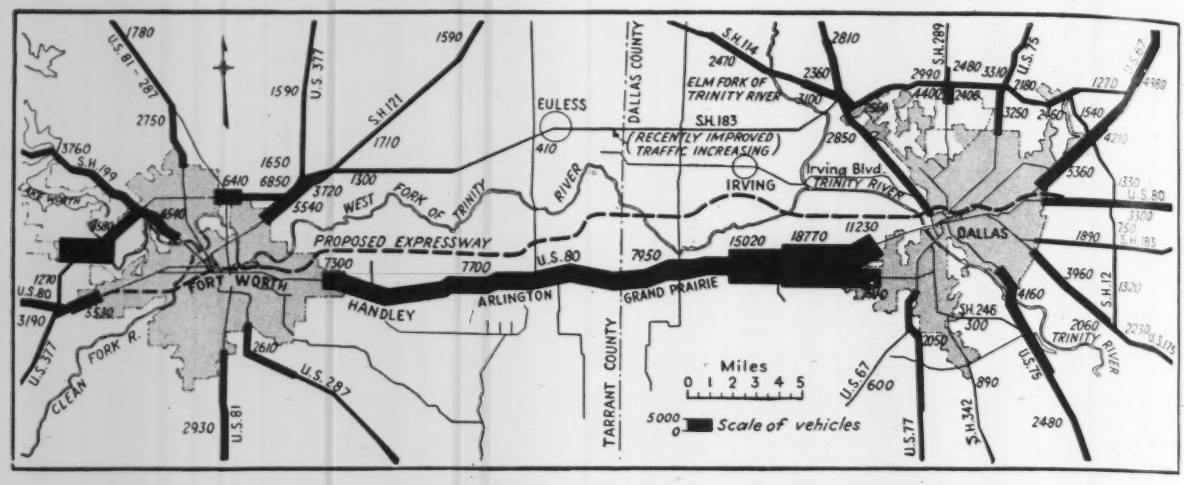


Fig. 2. Predominant traffic flow in the Dallas-Fort Worth area is east and west, through and between the two cities. Figures indicate average number of vehicles passing counting stations operated by Texas Highway Department in 1943.

Both Dallas and Fort Worth are growing rapidly. Dallas in 1940 had a population of about 285,000 but now is estimated to have in excess of 332,000 within the city limits. The expected spread of population is eastward, somewhat along the line of the proposed highway. Fort Worth had a population in 1940 of about 177,000 and now has some 221,000. Here again it is expected that the trend in residential expansion will be along the proposed highway, probably to the west and beyond the city limits.

The entire area has shown a rapid and steady increase in motor-vehicle registration except for the year 1942. The traffic volume at 28 representative stations on main highways in Texas showed that automobile traffic in August, 1944, was 37.7 percent below 1941 figures. However, on U. S. 80 between Dallas and Fort Worth the average daily volume was only 27.3 percent below 1941. It is expected that when tire and gasoline restrictions have been removed that traffic will show a marked upward trend and that by the time the proposed highway improvement can be completed, say in 1950, traffic will have increased at least 35 percent over the volume now using the highways in this region.

Traffic movement

Traffic surveys in 1943 indicated that during a 24-hour period some 51,566 vehicles entered or left the city of Dallas via the main highway. Of these, 35,620, or 69 percent, were traveling in a general east-west direction. Of the latter, 21,700, or 61 percent of the east-west movement, entered or left the westerly portals of the city. For a similar period there were 37,610 vehicles that entered or left the city of Fort Worth via the main highway. Of these 22,810, or 61 percent, were traveling in a general east-west direction. And of the latter 12,840, or 56 percent of the east-west movement, entered or left the easterly portal of Fort Worth. It is this east-west traffic movement to and between Fort Worth and Dallas that is considered in connection with the proposed improvement. In addition, much of the east-west intracity traffic movements, which are a large portion of the city traffic pattern, must be considered.

A unique method, enlisting the aid of local Boy Scouts and use of punch cards sorted by business machines, was employed for obtaining origin and destination information on traffic in the two cities. At 19 stations in Fort Worth and 25 in Dallas, Boy Scouts, under supervision of the consultants, recorded the last four digits of the license numbers, the direction, time of passing and types of vehicles passing each station. The survey was made on a typical business day, Tuesday, Aug. 15, 1944, and was carried on for a period of six hours, starting at 7 a.m. and continuing until 1 p.m. In addition parking lots and garages in Dallas were checked to determine the parking habits of cars entering that city.

The license number, time of passing and other data recorded were punched on business machine cards. These cards were sorted mechanically and the license numbers matched so that it was possible to determine between what stations of the survey any car made continuous trips. This method gives sufficiently accurate information as to the origin and destination of the vehicle trip within the area or zones influenced by the proposed new facility. Time of passing was recorded and used to determine if the trip was continuous through stations. If the time indicated stops the

ESTIMATED COST OF BUILDING THE DALLAS-FORT WORTH EXPRESSWAY

	City of Fort Worth 9.6 miles	Tarrant County 13.4 miles	Dallas County 14.2 miles	City of Dallas 5.5 miles
Clearing and demolition	$405,000	$80,000	$124,000	$425,000
Grading and drainage	3,710,000	2,125,000	2,460,000	2,100,000
Paving, expressway and new service roads	1,615,000	1,197,000	1,349,000	810,000
Bridges, structures and retaining walls	6,800,000	2,288,000	6,457,000	6,700,000
Alterations to utilities	450,000	20,000	20,000	335,000
Lighting	300,000	360,000	415,000	175,000
Landscaping and park development	1,200,000	855,000	975,000	415,000
Fencing and signs	395,000	305,000	315,000	240,000
Maintenance and traffic	25,000	20,000	35,000	50,000
	$14,900,000	$7,250,000	$12,150,000	$11,250,000
Land acquisition	4,730,000	120,000	300,000	8,500,000
Total	$19,630,000	$7,370,000	$12,450,000	$19,750,000

car was excluded from the record.

In addition, on the day of the survey, automatic counters were operated at some stations for 24 hours to secure a factor to convert the 6-hour count to a 24-hour period. The continuous trips thus outlined are plotted on the traffic flow map shown as Fig. 3.

It will be noted that a large number of vehicles enter or leave the central business district in both cities and made continuous trips between *two or more* of the counting stations, thus indicating potential traffic for the proposed highway. In Fort Worth, 31 percent of the total number of continuous trips were entering or leaving the central business district, and in Dallas, 23 percent entered the main central area and an additional 15 percent entered the fringe of the business district.

Data from the origin and destination surveys conducted in Dallas and Fort Worth in August and figures from previous surveys proved the need for an improved facility. Congestion in the central business district of both cities is causing considerable delay and inconvenience to motor-vehicle operators, with its resulting effect on business and industry in the commercial area.

Expressway recommended

To alleviate the existing conditions an "expressway" is recommended through and between Dallas and Fort Worth with no traffic lights, no intersections at grades, with opposing traffic streams separated and with controlled movements at carefully selected entry and exit points. Such an expressway would accommodate continuous movement of traffic through and to the cities, unhampered by start and stop driving, parking, or pedestrian movements, and with danger of accidents almost eliminated.

Data secured from the origin and destination surveys was used to select a location for the expressway that would best serve the traffic, providing direct routes, convenient points of collection and delivery, with minimum travel on existing congested city streets. The origin and destination surveys provided information on the current movement of vehicles, origin, routes traversed, the length of uninterrupted trips and the destination of such trips. By application of these data it has been possible to locate interchange points and provide adequate capacity for the movement of traffic to and through the cities.

The recommended route in Dallas and Fort Worth (see Fig. 5) has been so chosen as to provide an express connection from the residential area to points in and near the respective central business districts of the two cities. The consultants also have recommended that the area within the right-of-way to be acquired near the business districts be treated as a park or plaza development to accelerate the revitalization of these areas. Two such studies are shown in Figs. 1 and 4.

In using the data secured by the traffic survey, anticipated traffic trends have been taken into consideration. It is estimated that by 1950 during an average 24-hour period some 8,800 vehicles would enter the proposed expressway at the western terminus in Fort Worth. There will be an influx of vehicles at the interchanges east of this point and by the time the central business district is

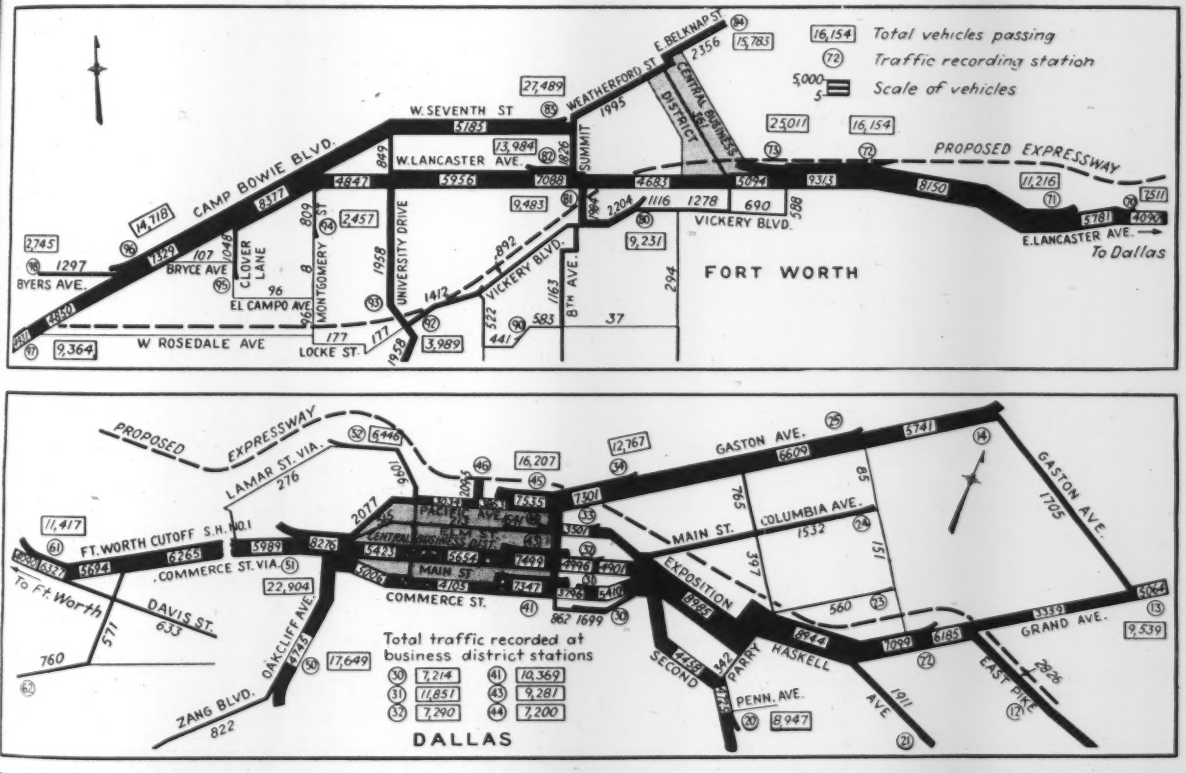


Fig. 3. ***Results of traffic-flow survey in Dallas and Fort Worth made on a typical business day in August 1944. Total vehicles passing a station are in "boxes". Vehicles passing two or more stations are shown on the street pattern.***

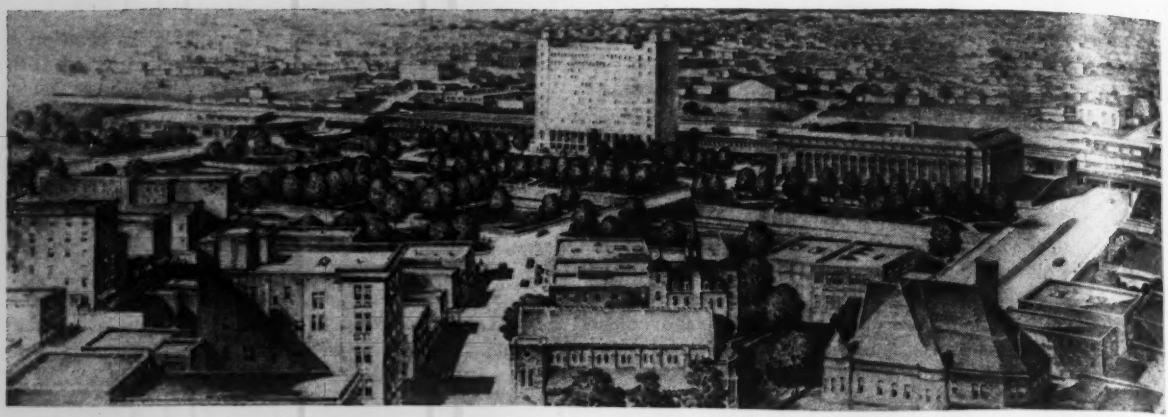


Fig. 4. Proposed development in Fort Worth for the area around the Postoffice and the Texas & Pacific Ry. Station. Note that the expressway is to be blended unobtrusively into a recommended park plan.

reached it is estimated that at least 22,300 vehicles will be using the expressway. Between Dallas and Fort Worth it is estimated that 9,200 vehicles will use the expressway. There will be additional vehicles from communities along the route and as it approaches Dallas it may be expected that there will be 13,100 vehicles on the expressway. As the route continues to the central business district, it is estimated that 30,500 vehicles will use the facility and at its eastern terminus some 15,100 vehicles would be entering or leaving the highway. It is estimated that peak traffic during rush hours would be about double the average for the 24-hour period.

The suggested location of the expressway is intended to serve not only traffic from outside the city but also traffic originating within the city limits. An analysis of traffic destination on the main arteries approaching the city shows that a relatively small portion is through traffic. It is recommended therefore, that the expressway be located to provide service for the greatest number of users, who are the ones destined for the central district of the city and many of whom originate in nearby suburban and fringe areas. Through the outer regions of the city the expressway is planned so that the residents of these areas may have convenient access to enable them to use the new facility for express service from points near their homes to the business district.

Planned for busses and trucks

Location of the expressway through the business and industrial areas of Fort Worth and Dallas will speed mass transportation by busses in a manner similar to that of rail rapid-transit, while trucks hauling into and out of the city will use the city streets only for a few blocks, thus relieving major traffic problems. The bus terminals of the long-haul lines are located conveniently near the proposed interchange points of the facility. Local busses can use the expressway from suburban areas to the central business districts and substantially speed their services for many riders.

There are 50 common-carrier motor freight lines serving Dallas and 34 serving Fort Worth. In addition there are many limited common carriers hauling certain goods such as oil field supplies and livestock. Most of this traffic can be carried on the proposed expressway through interchanges in the industrial and business areas.

The design standards recommended

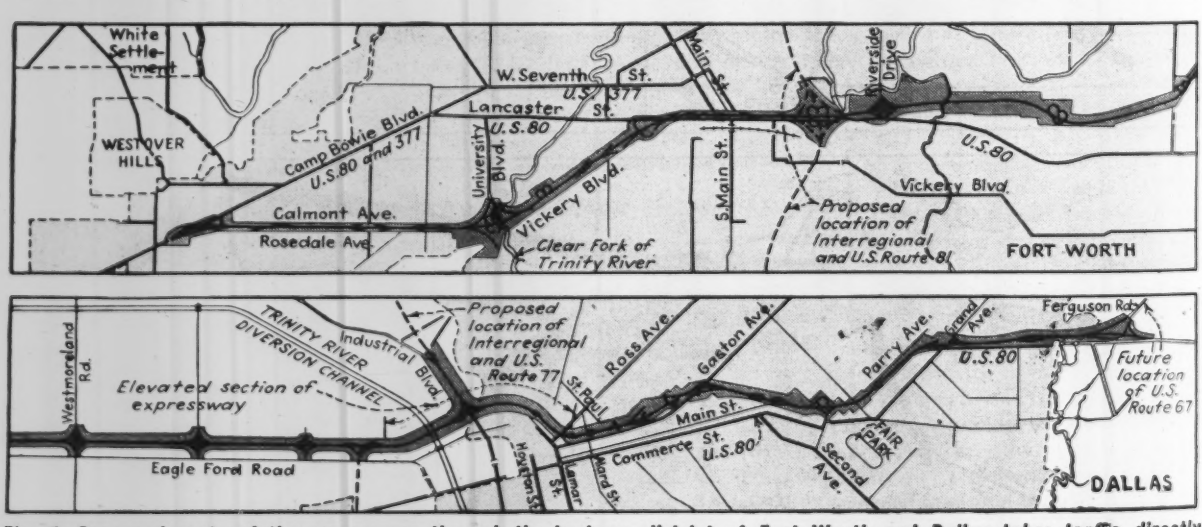


Fig. 5. Proposed route of the expressway through the business district of Fort Worth and Dallas takes traffic directly into the central business area where frequent interchanges are provided.

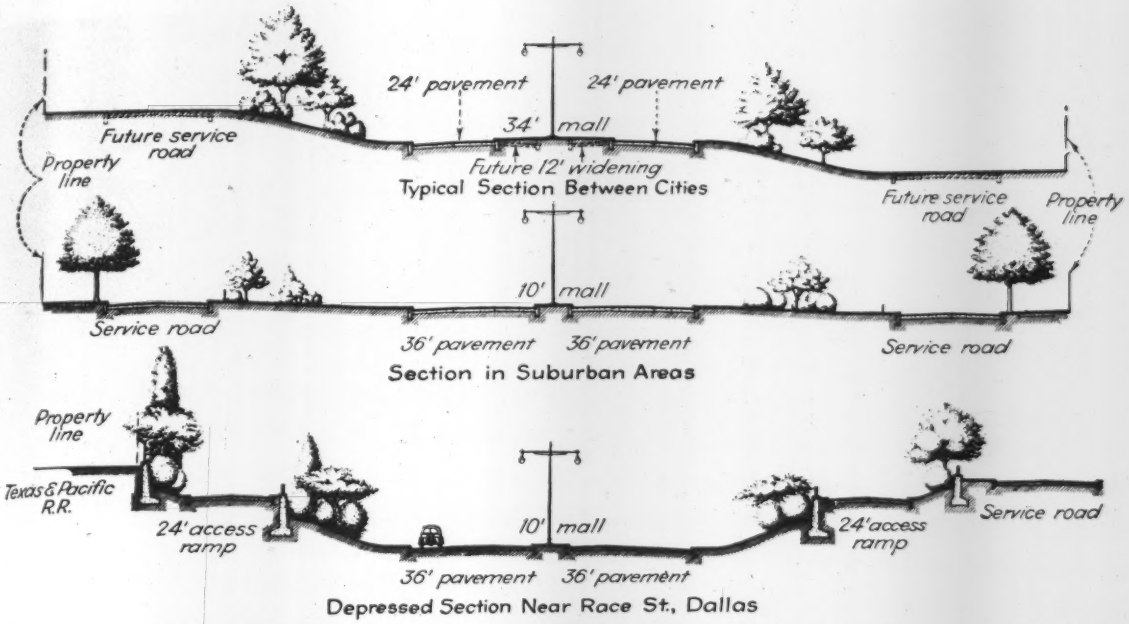


Fig. 6. The expressway is planned to provide two or three lanes for traffic in each direction. Through the cities the roadway will generally be depressed to accommodate streets crossing at grade.

for the expressway generally provide, in the cities of Fort Worth and Dallas, for two 36-ft. roadways with a 10-ft. shoulder for parking disabled cars and a 10-ft. center mall to separate the opposing traffic streams. Mountable curbs are provided at the sides of the roadway. In the rural areas between the cities, space is provided for two 36-ft. pavements but initial installation of two 24-ft. pavements is recommended, leaving the center mall 34 ft. wide. A rural right-of-way 300 ft. wide is recommended, which includes space for a service road of 30 ft. minimum width on each side of the highway, but only parts of this right-of-way will be needed initially.

The expressway has been designed for a speed of 70 mph. in the rural area and 50 mph. in the cities of Dallas and Fort Worth. Minimum radii of curvature will be 1,550 ft. and grades generally will range from 1 to 3 percent.

The interchanges have been designed so that the ramps have a maximum grade of 4½ percent, but generally are much less steep. Minimum radii are 135 ft. and in general are over 200 ft. Several interchange designs are recommended and include directional flow, trumpet and elephant-ear types, cloverleafs and parallel ramps to adjacent service roads.

Grade-separation structures are to be of reinforced concrete, rigid-frame type, or simple steel spans with open abutments. The river and viaduct crossings would be twin bridges of steel girders on open concrete piers each carrying a 36-ft. roadway. The elevated portion of the expressway, in Dallas, would be of steel, of a design using longitudinal stringers framing into two-column bents.

Concrete pavements are recommended, with color added to the surface to reduce the glare. To provide contrast with the main traffic lanes, the acceleration and deceleration lanes at the interchanges will have no color added. It is planned to light the central roadway by high mounted luminaires on steel poles. All areas outside of the paved roads will be landscaped and provided with walks where necessary.

Construction in stages

The project can be readily divided into sections for construction, and can be connected by temporary roadways to the existing facilities so that sections may be used as available, pending completion of the entire expressway. The sections most needing relief are the central business district of the two cities, hence the consultants have recommended that these be started first. They have pointed out that this situation makes it most desirable that the route and general character of the entire improvement be determined in advance of the start of any work so that the elements of the project can be properly coordinated.

The expressway, built to modern high standards of design, is expected to enable the highway users to travel more safely at higher speeds and with more driving comfort than is possible over the existing streets and highways. It also is expected to provide indirect benefits such as stabilization of land values, rehabilitation of adjacent areas and consequent stimulation of trade.

The project is estimated to cost $61,000,000, as shown in the accompanying table. This estimate is based on land value and construction costs which in the opinion of the consulting firm will prevail in the immediate postwar years. Construction costs were arrived at by making some upward modifications in the 1940 prices; land valuation was estimated by increasing the assessed valuation by a percentage factor.

The report was made for the Texas Highway Department for which D. C. Greer is state highway engineer, T. E. Huffman, district engineer in the Dallas area and E. C. Woodward, district engineer in the Fort Worth area. Lawrence S. Waterbury was in charge for Parsons, Brinckerhoff, Hogan & Macdonald.

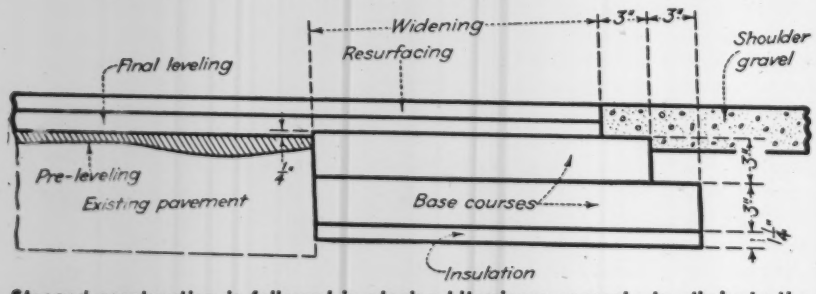
Many miles of narrow pavement are widened with bituminous concrete in Ohio to provide safe and efficient highways.

Ohio Pavements Widened Without Forms

***Contents in Brief**—Pavement widening on Ohio highways is performed without using side forms due to shortage of labor and scarcity of steel forms. Large resurfacing program required during 1944 to keep wartime traffic moving and to salvage old pavements on the verge of complete ruin. Methods developed during wartime expected to be projected into peacetime highway rehabilitation.*

THE USE OF SIDE FORMS was discontinued on many projects during 1944 by the Ohio Department of Highways in the widening of old pavements with bituminous concrete. Although born of a wartime necessity due to a scarcity of labor and a critical shortage of steel, this method has proved so successful as to warrant its continued use after the war. Its chief virtues include simplification of construction, economy effected by a saving in form-setting labor, reduced capital investment in the many hundred feet of forms required, and faster construction with less inconvenience to traffic.

Basically, this improved method of pavement widening, using bituminous concrete exclusively, consists of trenching to a width 6 in. outside of the final edge of widened pavement. An insulating course of limestone or slag screenings and the first base course layer of the pavement widening then are placed over the full width of trench. The second base course is stepped in 3 in. while both the leveling and resurfacing courses are stepped in an additional 3 in. The thickness of the different courses of bituminous concrete placed in this manner are such as to obviate the use of any side forms.



Stepped construction is followed in placing bituminous concrete to eliminate the necessity for side forms.

Although pavement widening and resurfacing has been an integral part of Ohio's maintenance and reconstruction program during the past eight years, the rapidity with which wartime traffic punished old pavements to a point beyond that of economical repair gave an added impetus to the program.

In the expanded widening program, most contractors took full advantage of all daylight possible, sometimes working as much as 16 hours per day with two crews. There were, in all, 509 mi. of pavement of all types either widened and resurfaced or resurfaced only, on the Ohio highway system during 1944. This compares with 409 mi. rehabilitated in like manner during 1943.

Large 1944 program

Contracts for 134 miles of combined widening and resurfacing amounting to $2,872,000 were awarded under 37 contracts last year, including eight carried over from 1943. Likewise, 124 contracts, together with eight awarded but un-

completed during 1943, covered 375 miles of resurfacing only during the 1944 program, at a total cost of $6,205,000. Of this total number of contracts awarded, nine were let late in the season under a provision that construction will not begin until this spring. No costs per mile of widening or resurfacing are available since some projects included resurfacing pavements four or six lanes wide. The major portion of the work, however, occurred on two-lane highways. The 1945 widening and resurfacing program is expected to approximate that of last year. A considerable amount of this work also will have to be done when labor and materials become plentiful after the war.

The best season for asphalt construction in Ohio is from June to August, although the official season runs from May 15 to Nov. 1. All work is scheduled for completion within this period except in unusual cases.

Largest single resurfacing project completed in 1944 was a 25-mi. job on the 20-ft. wide U. S. Highway 30-S between Lima and Kenton. It was let under two contracts and completed in 30 working days at an average cost of $5,700 per mile. Bituminous concrete was used entirely for the 1¼-in. thick one-course surfacing on this project.

So rapid was the deterioration and breaking down of old highway pavements carrying abnormal wartime traffic last year that the proper selection and sequence of constructing resurfacing projects was of paramount importance. Careful study and extraordinary care were exercised in securing coordinated program of pavement rehabilitaiton which would be the most beneficial to the war effort and salvage the maximum road mileage.

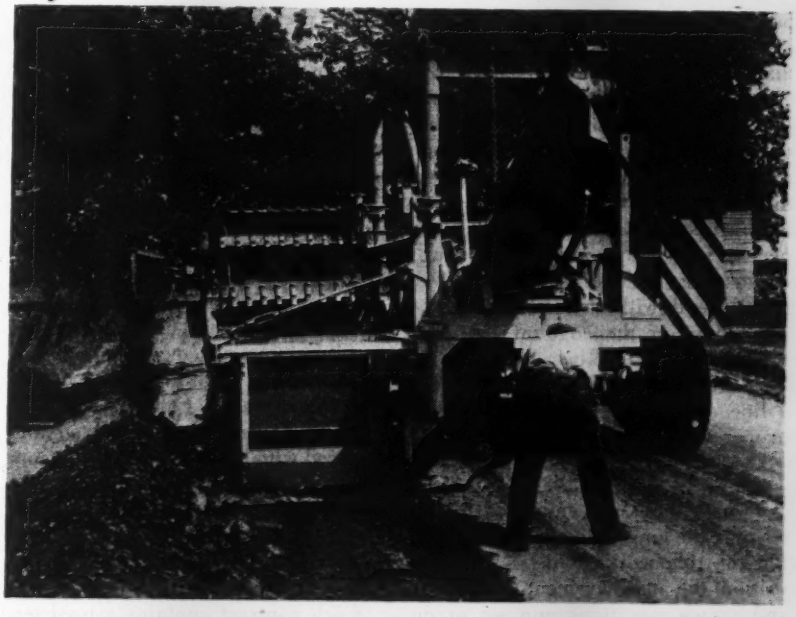
Selecting the repair projects

First step in setting up the 1944 program was tentative selection of resurfacing and widening projects by the department's twelve division engineers, with each project listed in the order of its necessity. As would be expected, the total estimated cost of such a program exceeded the amount of funds budgeted for the work. An on-site conference between the division engineer and a design engineer from the central office was held to determine the preferential rating of each proposed project coming within the limits of the yearly budget.

Old pavements are built up to proper crown and profile with a preleveling course prior to trenching for widening of pavements.

Several factors entered into the selection of rehabilitation projects. They included the urgent necessity for salvaging old pavements on the verge of complete failure, additional structural strength required to prolong the useful life of a pavement, and widening of dangerously narrow surfaces in the interest of safety. In general, the existing pavements were 18 ft. wide. They were widened to either 22 or 24 ft. depending upon the type and character of traffic to be accommodated. As an economic measure, widening was confined to one side of the roadway wherever possible.

The plans designate the number of courses to be laid in the resurfacing. When a preleveling course is specified it may be installed either before



Excavating with a trenching machine is preferred since it provides a vertical face for lateral support of the bituminous concrete base.

Stage construction of pavement widening includes compacted trench, foreground; rolled insulating course of slag screenings, center; and bituminous concrete subbase construction in the distance.

the trench is excavated for widening or after the base widening is placed. In general the first method is preferred.

Very little survey work is required when the preleveling course is placed first. Experienced operators of the asphalt pavers have little trouble in correcting the local depressions and undulations in the longitudinal profile of the old pavement.

Repeated passes of the black-top paver, however, are required to properly fill depressions extending more than 20 ft. along the pavement. By continual observation of an indicating level mounted on the paver, the operator can adjust his transverse screed to bring the leveling course to the proper crown. With the preleveling course applied in this manner, it is a simple operation to excavate the widening-trench to the proper depth with the trencher operating along on the edge of the preleveling course. When trenching is done first it is necessary to establish a line of grade stakes to obtain the proper subgrade elevation.

Profile determined visually

Two methods are employed to determine the longitudinal working profile for this work. One is to cross section the old pavement, plot edge and crown elevations and set grade stakes from this data. The other and simpler method is for one man to determine visually the high points on the surface of the pavement by sighting down the road while another marks them on the pavement. Grade stakes then are set to the required elevation by means of a cross-leveling board shaped to give the proper roadway crown. Any adjustments necessary to obtain a smooth profile are made with an upward correction to insure full coverage of the old pavement.

The preleveling course is applied to all extremely rough pavements being widened and resurfaced or resurfaced only, whether they are old brick, portland-cement concrete, macadam or bituminous concrete. Other preliminary preparations of old pavements include the usual prime coating, removal of fat or bleeding bituminous patches and sealing of cracks.

The prime or tack coat applied to old brick, portland-cement concrete or bituminous pavements, consists of about 0.1 gal. of bituminous material per square yard. Failed sections of existing pavement are removed and replaced with hot-mix bituminous concrete prior to placing the leveling course, or the preleveling course, if specified. Poor subgrade under such areas also is removed and replaced with suitable material.

Each contract contains a predetermined volume of extra leveling material, based on a careful appraisal of the number and extent of the depressions to be filled. This bituminous concrete is paid for at the contract price of leveling material. Ordinarily the amount of extra material is estimated to run between 150 and 225 cu. yd. per mile of 20-ft. pavement.

An experimental project launched

As an experiment in obtaining uniform bearing of broken and rocking portland-cement concrete slabs, a 10-mile stretch of pavement containing areas of such failures has been selected for resurfacing in 1945, with the preliminary corrective work done by the state's forces during the past year. This corrective work consisted of breaking the slabs into fairly large pieces and hammering them down into the subgrade to establish firm bearing. A 2,000-lb. skull cracker operated by a truck-mounted crane was used for this work.

After the old pavement sections were broken up and pounded into the subgrade, all loose material was swept clear from the areas, a priming coat was applied, and hot-mix asphaltic concrete added over the broken pavement to bring it up to its original contour. Some sections of pavement were pounded so deep into the subgrade as to require two 3-in. courses of bituminous concrete to bring them up to original grade.

About one percent of the entire area of old pavement in the 10-mile project was treated in this manner. This experimental project will be brought to completion with the application of the bituminous concrete surfacing.

Two methods are permitted for excavating the trenches adjacent to the old pavement; by a regular trenching machine mounted on a truck or by a motor-driven road grader. In either case the power equipment operates along the outside edge of the old pavement. In comparing the two methods, the one employing the trenching machine is favored by Ohio engineers chiefly because it forms a clean cut, vertical outside face of trench which gives lateral support to both the insulating and first base courses.

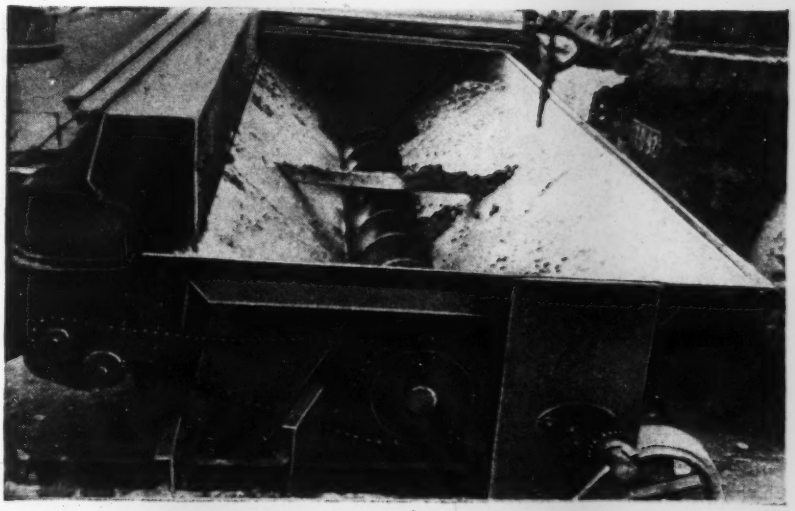
For postwar work of this kind in Ohio it is now planned to specify the use of trenching machines exclusively.

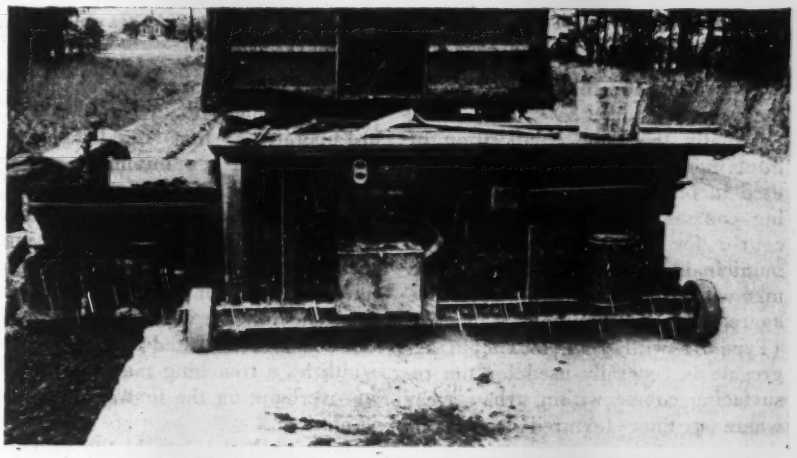
Trenches are thoroughly compacted after being excavated to the proper depth. All material removed is used

to widen roadway shoulders. There have been practically no instances where shoulder subgrade material has been found to be of such low shear value as to require sub-excavation and backfill with approved material. This is believed due in part to the severe compaction provided old road shoulders by trucks running on to them at frequent and repeated intervals, also to the presence of aggregate that has been added in shoulder maintenance.

An insulating course of crushed limestone or granulated slag screenings is placed to a compacted depth of 1¼-in. in the bottom of all trenches. French drains also are installed as necessary to insure positive drainage. Excavated trench bottoms, insulating courses and bituminous concrete base courses are compacted with trench rollers in lieu of standard tandem rollers.

The first base course of bituminous concrete is applied after the installation of the insulating course. Customary practice is to not open a greater length of trench in any one day than that which can be filled with the insulating and first base courses. This avoids damage from rainstorms or crumbling trench banks. Similarly, it is considered good practice to keep the application of the second base course as close behind the first course as conditions permit. Usually, a length of first base course placed one day will be covered with the second course the following day.





Bituminous concrete is deposited to a controlled depth in the trench by means of a spreader box equipped with a motor-operated screw auger (top view) and pulled by dump truck operating on the old pavement (bottom view).

Placing base course material

In depositing hot-mix bituminous concrete in the excavated trench adjacent to an old pavement to be widened, care is taken to prevent segregation of the mixed aggregates. On early contracts where the contractor was only equipped with dump trucks, it was necessary to dump the bituminous concrete onto a steel plate lying on the old pavement from where it was hand shoveled into the trench. This was a laborious and time wasting operation.

Up-to-date equipment developed for this type of operation includes two types of dumping and spreading machinery. One utilizes an ordinary dump truck fitted with a corner board next to the tailgate which permits the asphalt to be dumped out of that corner of the truck adjacent to the trench. It falls into a spreader pulled behind the truck, from where it flows by gravity into the trench as the truck moves along on the outside edge of the old pavement. This spreader is built to ride on a 5-ft. steel plate shoe which slides along the old pavement.

The other and more efficient method of depositing bituminous concrete in the trench includes an ordinary dump truck behind which is attached a spreader box equipped with a horizontal-screw auger about 8 in. in diameter. The bituminous concrete is dumped into the spreader box where the screw moves it sidewise into a hopper directly over the trench. Operation of the screw auger is by a power unit mounted on the frame of the spreader box.

Both base courses ordinarily are placed to a 3-in. compacted thickness. The first one is placed over the full width of trench and the second is stepped in 3 inches. The second base course is compacted to a ¼-in. height above the adjacent old pavement including preleveling course, if any, to prevent differential settlement of the succeeding final leveling and resurfacing courses.

Base courses are well rolled: the minimum amount of rolling being based on laying not more than 0.8 ton of asphaltic concrete per hour, per inch width of compaction roller, where trench rollers are used, and 250 tons per 8-hr. day for each roller where standard rollers are used. The average operator will place 350 tons of asphaltic concrete in an 8-hr. day. Tandem rollers weigh from 7 to 10 tons each and trench rollers weigh a minimum of 300 lb. per inch width of compaction roll. Specifications require at least two rollers be kept

Three-wheeled trench rollers are used to compact the bituminous base courses in the narrow trenches at the edge of the old pavement.

in operation for the compaction of the various courses.

Usually the same composition of bituminous concrete (Type A) is used in base course widening, leveling courses and in the resurfacing course for all projects outside of municipalities. It is a dense-graded mix with 1-in. maximum size coarse aggregates. Bituminous concrete (Type B) with ½ in. maximum aggregate is generally used for the resurfacing course within urban areas where a finer textured surface is desired.

Construction operations are both simplified and expedited by the use of the same mix in the different courses. It permits the contractor to shift from one laying operation to another without the complications arising from changing the mix.

Leveling and wearing courses

Ordinary resurfacing projects as well as those which are widened and resurfaced receive both a leveling and a resurfacing, or wearing, course of hot-mix bituminous concrete. For rural locations using the Type A mix, the leveling course is compacted to a ¾-in. minimum thickness and the wearing course to a 1¼-in. minimum. Type B pavement in urban areas carry both a 1-in. minimum leveling and a 1-in. wearing course.

Correct alignment of surface edges is a prime requisite on all resurfacing work, and where old pavements are resurfaced without widening, new surfacing material is not allowed to spill out onto the roadway shoulder.

In widening without forms, rollers are operated so that lateral displacement is kept to a minimum. Best results are secured by rolling each course first along the outside edge with the roller overhanging 3 in., then progressing towards the existing pavement with an overlap of not less than one-half the width of roller. If the trench is excavated to the planned width by a trenching machine the 3-in. overhang on the first base course is omitted.

Longitudinal joints in the various courses of bituminous concrete are offset 6 in. to permit proper compaction of the joint when placing the next course. On two-lane resurfacing the longitudinal joint in the surface course is placed at the centerline of pavement. A dense joint is secured by the paver lapping from 2 to 3 in. on the completed course.

The excess material placed on the completed course is immediately pushed toward the joint, depositing the fines at the joint and scattering the coarser material farther away. In compacting the joint the roller operates on the completed lane overlapping the freshly spread material about 4 in., thus insuring a well bonded and dense joint.

Additional emergency roadway width and protection for rehabilitated pavements is provided by placing a 3-ft. wide layer of aggregate on the roadway shoulder adjacent to the widened or resurfaced pavement. This material is of a select grading and contains sufficient binder fines to compact well under traffic.

Many advantages are believed to result from the use of hot-mix bituminous concrete for both widening and resurfacing. The cost of resurfacing an old 18-ft. pavement and widening it to 22 ft. is approximately $20,000 per mile, including all shoulder gravel, drainage, berm dressing and seeding.

Other advantages include the securing of a relatively smooth but nonskid surface which reduces impact from traffic and extends the life of truck and auto tires. This is considered to be a direct benefit to the war effort. Old pavements are strengthened and sealed by the addition of the surfacing material and their useful life is prolonged. Traffic can resume travel over a resurfacing job within a few hours following final compaction. Large mileages of old highways can be rehabilitated within one season, and at no time is it necessary to completely close any section of road to traffic, since two-lane pavements are resurfaced one lane at a time and only the lane actually under construction is barricaded.

Field supervision

Engineering services required to prepare plans and to supervise field construction is reduced materially under this procedure. Field engineering usually is limited to a project engineer and inspector who supervise the placing of bituminous concrete and other incidental work, under the supervision of a division engineer.

At the mixing plant an inspector, representing the testing laboratory, controls the manufacture of the bituminous concrete. He is assisted by a checker who issues weight tickets which are collected at the job. Overall supervision is delegated to two assistant construction engineers, each being assigned to one-half of the state, and reporting to the chief construction engineer.

H. G. Sours is director of the Ohio Department of Highways, and Glenn R. Logue is assistant director and chief engineer. R. O. Nelson is chief engineer of construction. His assistant engineers on bituminous widening and resurfacing contracts are Fred W. Kimble and Harold H. Cummings. Chas. W. Allen is chief engineer of the department's testing laboratory.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Sanitation Safeguards at Navy Bases

N. A. Bowers
Pacific Coast Editor
Engineering News-Record

***Editor's Note**—On Japanese-held islands of the Pacific battlefront experience has been accumulating on methods of safeguarding the health of troops that work under tropical conditions. The following notes have been assembled as a record of some observations made in the Central, South and Southwest Pacific theaters of operation.*

THE TIDE OF BATTLE on tropical islands in the Pacific might easily turn on the policy of commanding officers in the matter of sanitation, according to a high Navy official who recently inspected health safeguards at the front.

"The strength of work parties," he said, "can easily be cut 30 percent within a few days by diseases resulting from inadequately protected food and water supply. The greatest risk is when the work parties move in immediately behind the combat troops, before there has been time to set up essential facilities. Just at this time, when men are putting forth the maximum in physical effort with a minimum opportunity for rest, they most easily fall prey to disease."

Sanitation program proves effective

Taught by experience, our sanitation program for front-line construction workers is now on a high plane and has shown excellent results. For example, on one island where Japanese resistance was stubborn, our forces had less than ½ of 1 percent of their number on the sick list at any time during the extensive reconstruction that was carried on with feverish activity immediately after our forces got ashore. This satisfactory record is ascribed to the fact that the island commander backed up the medical department in strict enforcement of rigid sanitary requirements necessary to safeguard the health of combat troops.

What are some of these requirements and what are present standards by which the Navy makes sure that health will be protected where men work under such great nerve strain, eating and sleeping when and where they can? The following summarizes observations made at several of our advanced naval bases.

Advance planning essential

The conquest of Pacific islands that have been well fortified by the enemy is largely a problem of getting men, equipment and supplies ashore and established on a beachhead in the face of strong opposition. The landing operations are expected to be difficult and in advance planning there is agreement that it is of utmost importance that nothing be taken ashore except what is absolutely necessary. Thus, supplies and equipment incidental to emergency sanitation must have their advocates present in the councils where the "necessary" items are being selected and allotted space in cargo for each new advance. Equipment needed for the sanitary measures has to do with protection of food and drink, fly and mosquito control and the disposal of health-menacing waste.

Water must be taken ashore in drums until conditions permit setting up distillation units. Flyproof pit latrines must be taken in ready to set up, and the rule is that these must take precedence over setting up galleys. Until screened galleys are in service no deviation from K or C rations is to be permitted.

The water supply, if necessary, can be kept down as low as 2½ gal. per day per man for all purposes (drinking, washing, shaving and such cooking as may be done). This is a minimum and efforts are made to increase the supply to 5 gal. per day as soon as possible. The 5-gal. figure means just barely "comfortable living," and if it can be increased to 10 gal. per man per day morale is more easily maintained.

Screening of galleys and latrines is not sufficient, however. Where there is great concentration of men in a small area there must be meticulous cleanup and control of fly and mosquito breeding places. Food cans and garbage must have prompt disposal by burning or burial. Not even dishwater may be thrown out on the ground. Only by enforcement of these rules can the desirable high health records be maintained in the tropics.

Modern mess tray aids sanitation

Because flies are the greatest menace as carriers of dysentery and diarrhea there is great advantage in the use of the modern mess tray instead of the old-style mess kit. The former are easier to keep clean and can be quickly put through steam treatment after being washed in hot water. Where these utensils remain

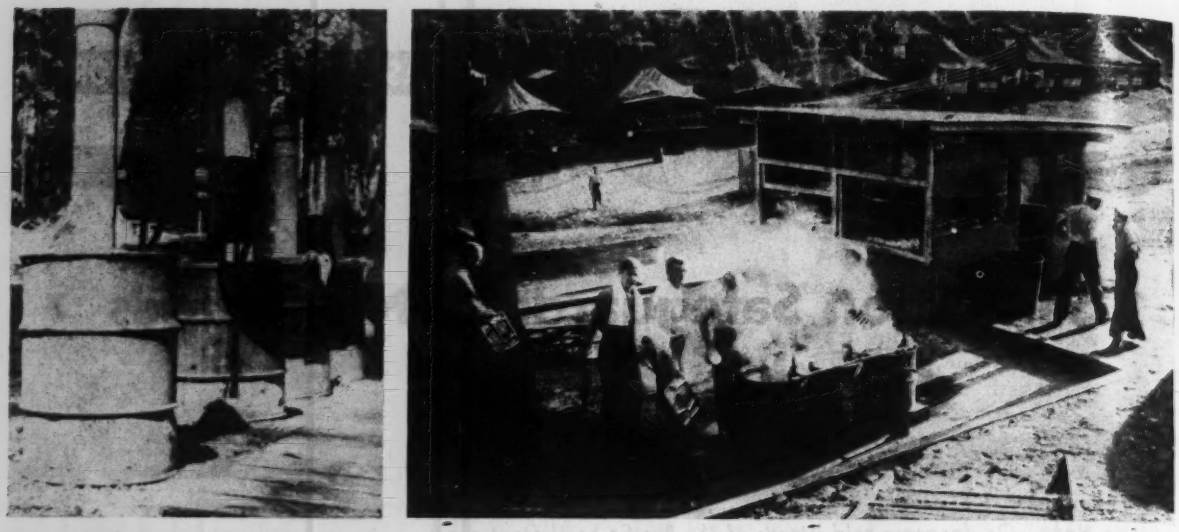


Fig. 1. These water heaters, made from oil drums, operate where no steam heat is available. Right: At least three drums of hot water are needed after food remnants have been scraped into garbage containers. The first two drums holds soapy water and swabs for use in cleaning trays; the third drum holds clear running water.

in possession of the individual between meals it is highly desirable to have the queue of men in line for "chow," dip their trays in scalding water before rations are served. This safeguards the men from contamination of the utensils during the interim between meals. After each meal, of course, trays or kits must be immediately cleaned and sterilized.

Appended are descriptions of typical examples of expedients developed for sterilizing mess kits or trays and disposing of garbage, including tin cans and galley refuse generally.

Oil drum water heaters

The commissary for construction battalions that closely follows combat troops rarely can get steam heat for facilitating the chow line cleanup after meals. However, it has been demonstrated that very satisfactory equipment can be made from empty oil drums and these are practically always available after a beachhead has been established.

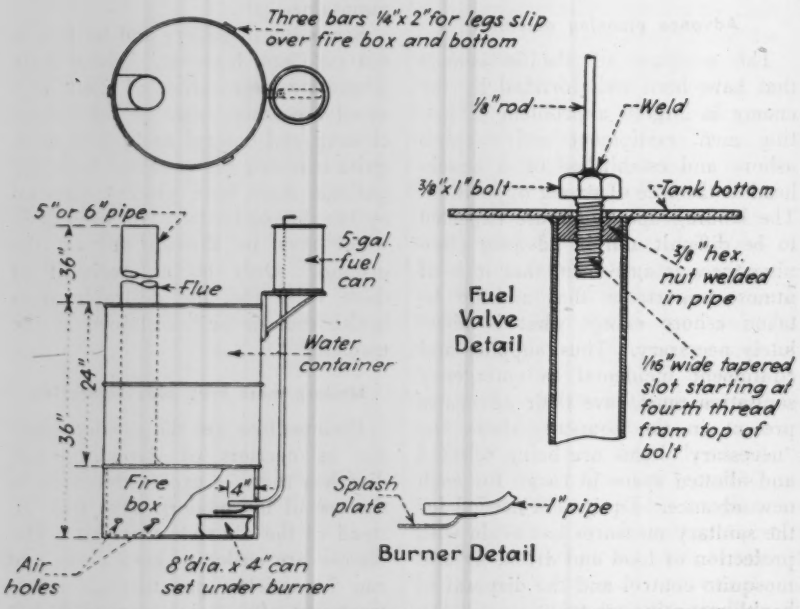


Fig. 2. Details of oil tank and burner that make each of the four oil drums, shown above, an independent water heating unit.

In Fig. 1 is shown a row of four such heaters made from junk or scrap equipment assembled with a few accessories, such as valves and fittings that can be found in almost any stockroom. This particular installation was used for enlisted men's mess on the front line in the Southwest Pacific area where it was built by the 60th Naval Construction Battalion. The equipment was designed by C. A. Blanchard, machinist's mate, second class.

The fuel supply for these heaters was mounted at a safe distance from the burner and firebox. The flue passes up through the water container for maximum conservation of heat. Two ingenious features are the accurately controlled oil feeding device and the burner designed to make sure of effective and economical combustion. Details of both these features are shown in Fig. 2.

The standard 55-gal. oil drums were used and the top one-third was first cut off and fitted on as a firebox beneath the larger portion. The valve feeding the oil supply through the bottom of the fuel tank is controlled by a rod extending above the top of the tank. This valve can be set to accurately control the rate of flow.

In the burner fuel drops on a flash plate where it is ignited and then falls, burning, into the can below. The can concentrates the flame and forces the heat to travel entirely across the bottom of the water tank

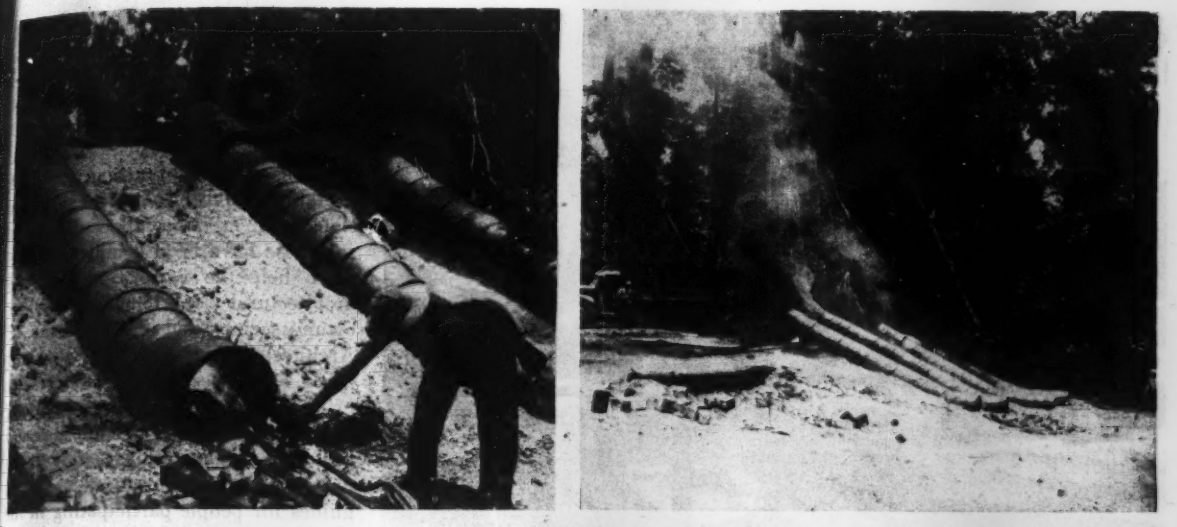


Fig. 3. Regulating the diesel oil burner at the lower end of one of the inclined "incinerators" composed of oil drums welded together. Right: Garbage cans are delivered by trucks at the upper level. Tin cans and other non-combustibles are raked out at the lower end.

above on its way to the flue. Air intakes adequate for the necessary updraft in the flue are made around the lower edge of the firebox.

Within an hour these units could bring 30 gal. of cold water to the boiling point, and they were successfully used for this purpose three times a day. Four units were installed to make sure of enough steaming hot water for a thorough cleansing of trays after food waste had been scraped into a garbage container.

The men filed by the three hot water drums (as shown at right in Fig. 1) after stopping at the garbage container, and every man was required to dip his tray in each drum of boiling water. The first two containers held soapy water and swabs for use in cleaning the trays. The other one was filled with clear rinsing water.

Effective garbage incinerator

Where a considerable number of men are fed, sanitary garbage disposal facilities can be provided by relatively simple means. Witness the ingenious arrangement of four tubes that were made to serve as incinerators by simply cutting the heads out of oil drums and welding them together. This particular plant was built and operated on a Pacific island by a naval construction battalion, of which Comdr. K. P. Doane, CEC, USNR, was officer in charge.

To get the proper combustion in an incinerator of this sort it was found desirable to build it on sloping ground and to bring both fuel and compressed air lines to the lower end of the tubes. It worked best with air pressure of about 30 lb. per sq. in. By adjusting valves in air and fuel lines, a burner arranged as shown in Fig. 3 would accomplish the desired result quite effectively, bringing the dry, non-combustible refuse such as burned out tin cans, down to the point where they could be raked out on the ground.

The use of four of these incinerator tubes made it possible to switch burner and air line, which were served by rubber hoses, from one unit to another, thus providing adequate capacity and allowing time for one unit to cool off and be raked clear before it had to be used again.

Distillation unit operation

Operation of water distillers must be checked occasionally to make sure the unit is not being operated under

Fig. 4. A long rod manipulated from the upper end of the tube incinerator aids combustion and removal of ash.

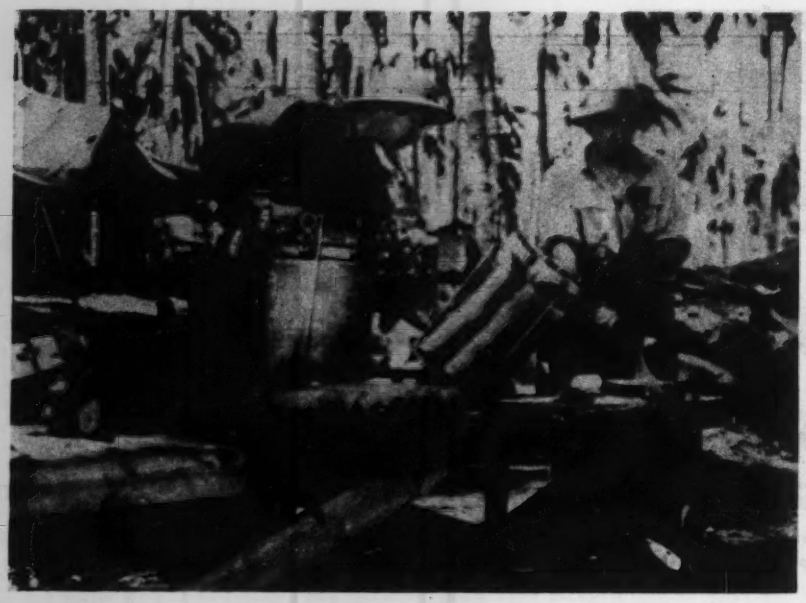


Fig. 5. This Jap water filtration outfit captured in the Marshalls is believed to have been used with chlorination treatment. Pressure is developed by a geared hand pump which forces water through cylinders of baked clay. This material is of such a fine quality as to closely resemble porcelain. A chlorine tablet is then added, it is believed, to water filtered in this way. For notes on "diatomite filters for troops," as developed by the Corps of Engineers, USA, See Engineering News Record July 13, 1944, vol. p. 38.

a vacuum. In some units condensate can be produced with temperatures never above 170 deg. F. Under such conditions coliform organisms B. coli may be found, water may be unsafe.

The Navy uses distillation units of rugged construction in various sizes. Though smaller sizes are more flexible and permit of subdividing forces for the safety of dispersal, a preferred size is the 2,000-gal.-per-day unit. This is small enough for easy handling and has a capacity adequate for camps of the size frequently used in hostile beach landings. Where evaporator capacity permits, it is good practice to take down the distillation units after every hundred hours of operation to clean the condenser tubes. Otherwise, scale in the tubes is likely to result in burning them out.

Russians Rehouse Two Million

Vast strides forward have been made in reconstructing liberated areas in the U.S.S.R., according to data compiled from Moscow reports by Arthur Ling and described at a recent meeting of the Royal Institute of British Architects in connection with the American Housing in War and Peace Exhibition (*Journal*, Royal Institute of British Architects, Vol. 51, No. 12, Oct., 1944).

For example, in the Smolensk district home construction was started in the middle of August and by the first of November, 25,000 houses was completed. In the liberated areas as a whole, by February of this year 2,000,000 people had been rehoused; 326,000 new homes had been erected and 25 factories for housing materials were in operation. Also, the Russians had reconstructed many railroad stations and had rebuilt or newly built 1,700 public restaurants and 2,300 schools. For reconstruction this year, the equivalent of $3,200,000,000 has been allocated. The 1944 housing goal is 1,000,000 new buildings.

One of the most striking features of the reconstruction of devastated regions is the participation of the people in the rebuilding of their town with the cooperation of neighboring localities who send materials, tools, equipment and labor. The local trade unions help with technical advice, tools and transport. Building technicians and architects act as supervisors.

By decree of August, 1943, thirteen factories, capable of turning out 4,000 prefabricated dwellings a month, were slated for erection. Recent reports say these have been completed.

To help the various regions, the architectural departments of certain commissariats and the Academy of Architects have designed standard types of houses. The Commissariat of Agriculture has published an album of 82 different types of buildings and building organizations and trade unions have also produced pamphlet guides for people participating in the reconstruction of devastated areas.

However, Russia has decisively rejected any standard plans for villages or new towns. While stress is placed on speed of reconstruction, emphasis is given to the layout of towns.

City planning stressed

In a recent issue of the *Soviet War News*, a description is given of the type of village most favored by the people who are going to live there. From the main highway a paved road should lead to a village green, around which should be lime trees and poplar trees and houses on three sides.

Administration buildings, schools, etc., should be built of different materials to give variety to the layout. If the village is large, there should be several village greens joined together by roads. These villages must not lie, as they did previously, along the main highways in two monotonous rows of houses, but must be developed around *culs-de-sac* off the main highway.

The order in which reconstruction is undertaken is unusual. Immediate efforts are directed toward restoring industry, next schools are started; then, public restaurants are restored and new ones built to provide communal feeding centers; and last, but not least, some of the theatres are rehabilitated, so that the social life of the towns begins to flourish almost before there is a house available.

As regards construction material, the aim is to utilize local building materials when possible; otherwise prefabricated houses of such materials as gypsum plaster blocks, concrete blocks or coal ash bricks are shipped to the site.

Reservoir Leakage Stopped at Outlets

L. A. Schmidt, Jr.
Engineer, Chattanooga, Tenn.

***Editor's Note**—Asphalt grouting, at the outlets of reservoir leakage, has been successful in stopping seepage through a seamy limestone formation at a Tennessee Valley Authority dam. The work described is a full-scale test and investigation of methods planned for an extensive postwar project to minimize loss of water that is equivalent to 10 percent of the hydro plant capacity. The author of the article formerly was acting construction engineer for the TVA on leakage correction work at Hales Bar and Great Falls dams and is now in private practice.*

LEAKAGE through limestone formation of ten percent of the water required for the operation of a hydro-electric plant, coupled with a persistent increase in the rate of flow, has compelled investigation of corrective measures at Great Falls Dam of the Tennessee Valley Authority. Results obtained from experimental work indicate that a proposed novel method of grouting at the outlets of the leakage is feasible and the work will be undertaken as a postwar project when men and materials are available.

The project is in central Tennessee on the Caney Fork River, a tributary of the Cumberland watershed. The dam was built originally in 1915-1916 and was redesigned and raised 35 ft. in 1925, giving it a normal operating head of 147 ft. The structure was built by the Tennessee Electric Power Co. and was acquired by TVA in the general transfer of properties in 1939.

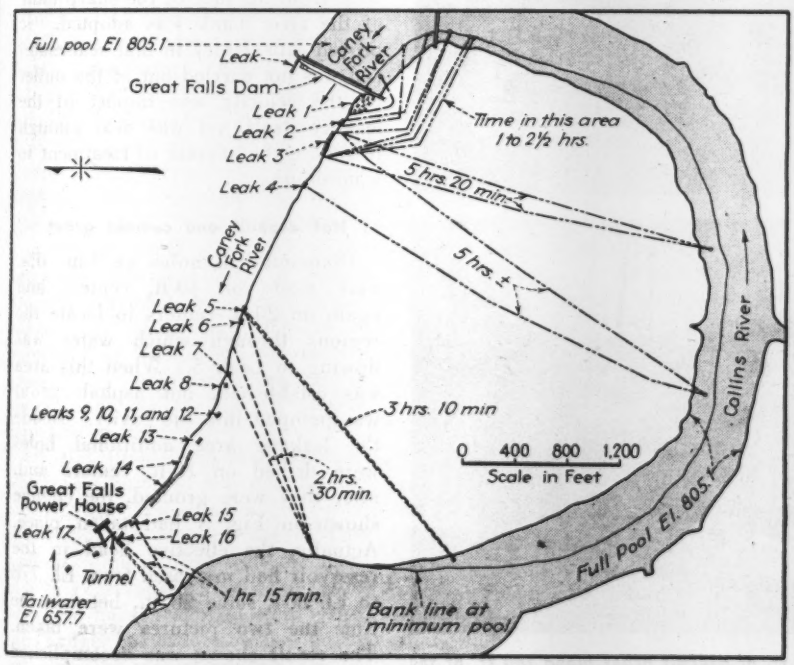


Fig. 1. Route of test dyes put into known inlets in the upper pool with elapsed time until color was noted along the bank in the tailwater pool. Dye paths indicate connecting inlets and outlets but the path between is not known.

The dam itself is only 92 ft. high, the higher operating head being possible due to an unusual topographic condition. The Collins River, one of three main tributaries to the project, flows into the Caney Fork immediately above the dam. For a distance the Collins River originally flowed in an opposite direction to the main stream so that at a point about one mile downstream from the dam it was possible to connect the two streams by a tunnel less than 600 ft. long. By placing the power house at this location an additional 55 ft. of head was obtained (see Fig. 1).

Leakage through old channel

Geologic formation in this area are the Fort Payne and Warsaw limestones which overlay the New Providence. The Fort Payne limestone is embedded with an abundance of chert. After the water was raised to the higher reservoir level in 1925, incipient seepage through the ridge between the two rivers started leakage at the junction of a seamy limestone (Upper Fort Payne) and a cherty resistant limestone (Lower Fort Payne). It is believed that this leakage channel existed long before hydro-electric structures were built but that erosion of the Collins River to a bed below the seamy limestone had stopped the leakage and permitted silting of the inlets. After construction of the higher dam raised the water to above the level of the impervious material, seepage started again and increased until it became leakage as high as ten percent of the capacity of the hydro-electric plant. Furthermore, measurements recorded between 1935 and the present time indicate an increase in leakage of about eight percent per year so that the loss of energy is becoming a serious factor. There has never been danger of failure of the structures or of rapidly increased flow.

About half way between the dam and the power house one leak ,known

as Leak 5, has been predominantly greater and more obstinate than any of the others. Some of the leaks along this traverse dried up at lowered water elevations, but Leak 5 persisted throughout the entire range of reservoir levels. To prove the efficacy of a leakage correction program at this project, it was felt that an attempt should be made to seal this particular leak. If this could be accomplished readily, there was no doubt about sealing the other leaks and the extent and schedule of work on the project would then be governed by the economics of water conservation versus costs.

Experienced crew available

TVA had an experienced foundation treatment force available, just completing an extensive repair job of stopping practically a river flowing under Hales Bar Dam (*ENR* Nov. 6, 1941, p. 654). A part of this crew and equipment was moved to the Great Falls area and sealing of the one leak undertaken to determine proper treatment methods, equipment and manpower requirements and probable cost so that the project might be ready for early scheduling in the postwar period.

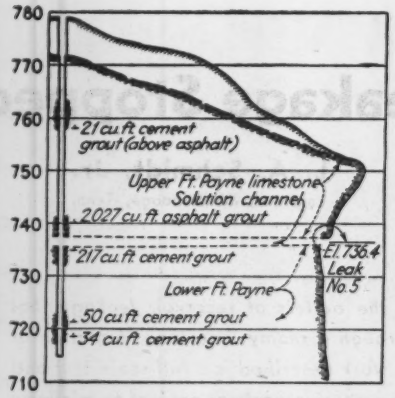


Fig. 2. Section through a typical diamond-drilled and grouted hole. Figures show cumulative number of cubic feet of cement and asphalt used in grouting to 1 psi. per ft. of depth.

It was decided to attempt the sealing of Leak 5 near the point of discharge rather than at the inlet end. Ordinarily it would be best procedure to seal leakage at the inlet, particularly when the integrity of a structure is involved and where hydrostatic uplift would be dangerous. These conditions did not exist, however.

The traverse along the inlet side of the leakage area is of considerably greater length and rougher terrain than the traverse along the outlet side. It was believed that just as good results could be obtained at less cost and with use of less material by working along the outlet side. Furthermore, sealing of one or more inlets was no guarantee against flow breaking out at some other nearby point so that 100 percent coverage would have been required along the longer traverse. In addition, by working near the outlet end, it was possible to observe accurately the results and the progress of the work.

Work was carried on as close to the leakage outlets as feasible to keep the number of holes necessary and material used in sealing the cavities to a minimum. A distance of 60 ft. back from the face of the sharp bluff of the river bank was adopted. It proved satisfactory in that seal material was not carried out of the outlet by the velocity and impact of the leakage itself, yet was near enough to reduce the amount of treatment to a minimum.

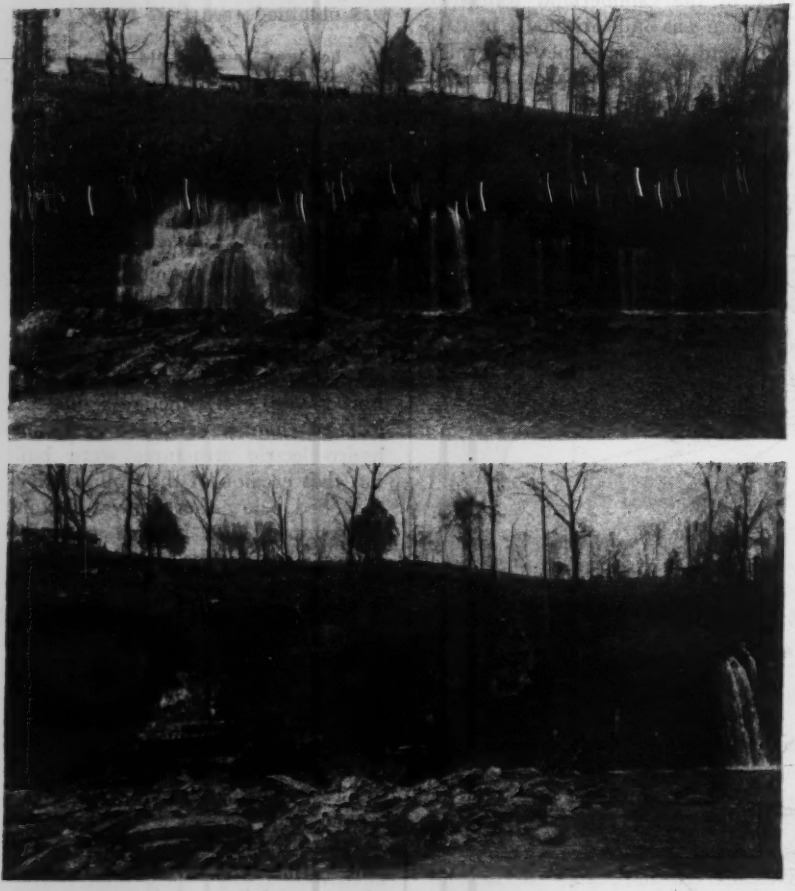


Fig. 3. Before and after placing 5,500 cu. ft. of asphalt grout along 140 ft. of the bank. Note holes for grout being drilled only 60 ft. from the outlet of the leakage. Water at right of lower picture is from a leakage channel that is active at high reservoir levels.

Hot asphalt and cement grout

Diamond-drill holes of 3-in. dia. were made on 40-ft. centers and again on 20-ft. centers to locate the regions through which water was flowing to Leak 5. When this area was established, hot asphalt grout was pumped into the cavity. Inside the leakage area additional holes were drilled on 10-ft. centers and, after they were grouted, the change shown in Fig. 3 had taken place. Actually, the effective head in the reservoir had increased from El. 778 to El. 804, some 26 ft., between the time the two pictures were taken. The result shown was accomplished by placement of about 5,500 cu. ft. of asphalt. There has been no revival of the flow in the six months

since the grouting was done, so it appears that the repairs will prove permanent.

To consolidate the gains that were made, additional holes were drilled on 5-ft. centers at an additional 35 ft., beyond the asphalt holes, from the face. The new holes were cement grouted, cement from the consolidation grouting being visible in the lower picture of Fig. 3.

In addition to the work at Leak 5, holes were drilled on 120-ft. centers for the full distance from the dam to the powerhouse. All of these holes were dye-tested to establish the direction and the intensity of the leakage at that point so a method of attack could be established and an accurate estimate of the costs of the complete project determined. Furthermore, from the areas at which it appeared that complete sealing with cement grout might be accomplished, one area was chosen to determine the effect of the grouting, and the approximate "take" of grout per foot of hole established.

The results of the experiment indicate that leakage can be cut off within justifiable limits of expenditure. It will be possible to effect this result without drawing down the reservoir, although it may require use of a somewhat greater amount of asphalt, but less cement, than would be necessary if the water level could be lowered.

The large percentage of chert present in the limestone presents a real problem in drilling and cost of drilling will be high. It is possible that wagon drill holes can be used in some cases and in others a reduction from 3-in. dia. to 2⅜-in. dia. core drilled holes, with substantial economies, is a distinct possibility.

In the experiment, 2,400 ft. of 3-in. dia. diamond drilling was done and 9,900 cu. ft. of cement grout was placed in addition to 8,200 cu. ft. of asphalt. This test represents about 7 percent of the estimated drilling, 4 percent of the cement grouting and 9 percent of the asphalt grouting required to stop practically all seepage. It is believed to be fairly representative of the work that is planned as a postwar project to completely seal off the seepage.

Forced Ventilation of Sewers Retards Sulphide Disintegration

While sewer ventilation is not a cure-all, it is highly probable that its field of usefulness is broader than has generally been realized and that the years ahead will witness increasing use of ventilation procedures, according to Richard Pomeroy, consulting chemist of Pasadena, Calif.

In a paper presented at a recent meeting of the Federation of Sewage Works Associations (*ENR*, Oct. 19, vol. p. 463), Mr. Pomeroy gave the following reasons for sewer ventilation: (1) To eliminate lethal atmospheres (oxygen deficiency, hydrogen sulphide, carbon monoxide or cyanic acid gas); (2) to eliminate explosive atmospheres (fuel gas or volatile flammable liquids); (3) to reduce concrete corrosion by hydrogen sulphide; (4) to prevent damage to plumbing in buildings by corrosive gases; (5) to prevent escape of odors, and (6) to prevent oxygen depletion in the sewage.

Of the three principal ways in which ventilation of sewers is accomplished, the least effective is provision of holes in manhole covers. This method, while it dries out the manhole to a certain extent, does not eliminate the hazard of explosion. Also, the danger of odor escape is increased. The second method, ventilation through house plumbing vents, likewise does not dry out the sewer and has the additional disadvantage that it carries hydrogen sulphide into the house plumbing instead of away from it.

The third method, using forced draft, is now in operation at Melbourne, Australia, and Los Angeles, Calif. In the latter city three ventilation stations are in operation, serving three different purposes.

At the north outfall sewer, the ventilation station is located in the middle of a 6-mi. section of a 9.5 x 12.3-ft. semi-elliptical sewer. Two 75-hp. blowers discharge 44,000 cu.ft. of air per min. from stacks 80 ft. high at a velocity of 200 ft. per sec. This station was provided to prevent disintegration of the sewer, the necessity for applying a protective procedure in this case being a good illustration of the fact that serious sulphide corrosion of sewers is not limited to places where sulphide concentrations are so high that the sewage can be smelled for miles around. The sewage in the north outfall is not conspicuously odorous, and the average concentration of dissolved sulphides is only about 1.5 ppm. It has been found that mere dilution of the hydrogen sulphide in the sewer air is of little benefit and that ventilation must be thorough enough to dry the walls of the sewer and thus stop the conversion of hydrogen sulphide to sulphuric acid. The ventilation supplied has effectively dried the north outfall and apparently has stopped disintegration completely.

Another Los Angeles installation has as its purpose the elimination of complaints due to the escape from manholes and plumbing vents of odors trapped by an inverted siphon. At this unit a 40-hp. blower exhausts 7,000 cu.ft. per min. discharging through a stack 80 ft. high. It is completely successful in eliminating the cause of complaints, and has also dried out the inside of manholes in a large area.

A third installation in the California city serves to eliminate explosive atmospheres formerly present in the sewer at that location. Here a blower driven by a 7½-hp. motor exhausts 2,500 cu.ft. of air per min. This exhaust is deodorized by sprays of sodium carbonate solution and then discharged through a stack 70 ft. high.

These three stations in Los Angeles are completely successful in accomplishing their major purposes.

In analyzing the necessity for forced ventilation of sewers, the condition and size of sewer must be considered as must also the analysis of the sewage and sewer air, and a survey of industrial wastes which may have an effect on the sewer atmosphere. Alternative methods of treating sewage to eliminate corrosion are by the addition of ammonia to neutralize the acids formed, or by chlorination of sewage upstream to prevent the formation of hydrogen sulphide.

Building Sites Stabilized with Grout

Contents in Brief—The bearing capacity of a water-saturated, gravelly clay soil underlying a housing site was increased by filling the voids in the material with a soil-cement grout. Added through 1½-in. dia. pipes extending as much as 32 ft. below the ground surface, the grout was in the form of a slurry containing 15 to 25 percent of high-early-strength cement. Delivery continued until the slurry appeared on the surface, a pressure of 100 psi. sometimes being required.

PRESSURE GROUTING with soil-cement has been found economical for stabilization of low-bearing foundation soils for housing structures in the St. Louis area. The procedure has been proven practical in its application to 90 home sites on eight city blocks where a low-bearing soil was encountered. Constructed about three years ago, these buildings have shown no settlement to date, while other nearby structures built on untreated soil settled considerably, one so much so that it became uninhabitable.

The method used to stabilize the foundation soil for new construction is illustrated by the procedure followed in the recent construction of a Federal Housing Agency project consisting of ten 4-family dwellings. These structures were supported on a clay soil containing considerable gravel but having a low-bearing capacity in the original condition because of a high water table. The grouting was entirely local in character, being done after the rough basement excavation had been completed. The detailed procedure was as follows:

A two-man crew using a portable drill equipped with a vertical continuous helical shaft and five-tooth borium-faced bits put down fourteen 4-in. dia. holes spaced from 9 to 13 ft. apart in the 34x50-ft. basement area. Holes 32 ft. deep were used near the corners, while the ten intermediate holes were extended to different depths to obtain complete penetration, the shallowest being about 20 ft. deep.

Supply pipes inserted in holes

In the center of each drill hole a 1½-in. dia. pipe (called a standpipe) was inserted and, after being cut off about a foot above ground, the pipe was grouted in place with a soil-cement mixture containing about 10 percent cement. Addition of the soil-cement slurry to stabilize the foundation soil did not start until the next day, at which time the pipes were firmly fixed. (A 12-hr. wait would generally suffice, while in an emergency plaster of Paris added to the grout would permit stabilization to start at once.)

A grout made with silty loam containing 15 to 25 percent by volume of high-early-strength portland cement was used for the stabilization operations, the materials and water being mixed in a pug mill. The amount of cement added was determined by the distance the slurry was expected to travel. If the pumping distance was great, the slurry, normally of a mushy consistency, was made thinner by the use of more mixing water but richer by the addition of a larger percentage of cement.

Fig. 1. Holes for the grouting pipes were put down with a gasoline-engine-driven, portable drill equipped with a continuous helical shaft and borium-faced bits.

A gasoline-engine-driven, plunger-type pump, operating at the edge of the excavation, delivered the slurry through 75 ft. of 1½-in. dia. pipe assembled with swinging joints arranged in a figure-four pattern (Fig. 2). This pipe layout gave free access to all of the fourteen holes in each basement area.

Pipes pumped one at a time

The corner standpipes were pumped first and operations continued at a given pipe until the slurry made its appearance at the surface; sometimes a delivery pressure as high as 100 psi. was required for the deeper holes. When the slurry appeared on the surface, the soil surrounding that pipe was regarded as sufficiently treated and the standpipe was capped. The feeder pipe was then connected to the next standpipe and the operations repeated for all of the remaining fourteen holes.

Cost of stabilizing the foundation area for one of the 4-family dwellings was about $600. A total of nearly 48 hr. working time was required at each dwelling to do the drilling, to install the required piping and to add the slurry.

Grouting for existing buildings

The soil-cement grouting technique has also found wide application in the St. Louis area for the correction of poor foundation conditions under existing structures. This type of stabilization was introduced three years ago and since that time it has been used at more than 600 existing structures in the correction of foundation settlement, cracked walls, disrupted utilities and jammed doors and windows.

For example, Lee Garrell of the firm of Lee & Co., St. Louis, has stabilized the soil under more than 300 existing structures with unusual success. His method is to sink 2-in. dia. holes on 7-ft. centers on the outside of the building and close to the foundation

Fig. 2. Mixed by a portable pug mill, soil-cement slurry was delivered by a plunger-type pump through 75 ft. of 1½-in. dia. pipe assembled with swinging joints.

wall. In these holes are inserted pipes of varying length, the shortest being about 6 ft. long and the deepest extending 4 ft. below the footings for the basement walls (Fig. 3); by using different pipe lengths the voids in the supporting soil are filled more quickly. The procedure of adding the grout is much the same as with the method followed on new construction.

Cost of this work is determined primarily by the amount of drilling necessary and the general condition of the foundation of the structure. The cost ranges from $45 to $75 per hole, including drilling, pipe grouting and addition of the soil-cement slurry.

An important problem in the work with existing buildings is to determine when to stop pumping. During this operation it is necessary to keep careful watch inside the house, not only for expected closure of cracks in the walls, basements, and floors, but also for unusual developments. Also, while drilling the necessary holes on the outside of the structure care must be exercised to avoid damage to water pipes, electric lines and other underground utilities.

F. H. Elliott of the Wabash Drilling Co. was given the contract for the stabilizing operations for the ten 4-family buildings, which were built by Walter Livengood, Inc., under FHA sponsorship.

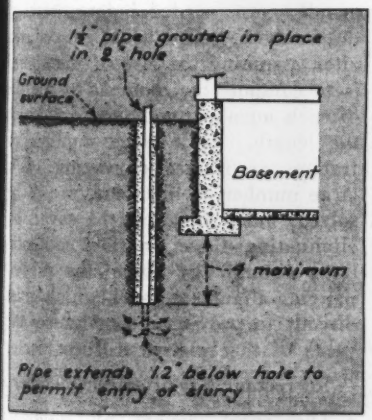


Fig. 3. In stabilizing the soil below existing buildings, grout pipes are installed near building, the longest extending about 4 ft. below the wall footings.

Fig. 4. Grout required below existing structures is added by a pump directly connected to the standpipes.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Accurate Volume Measuring Device for Soil Density Tests

For some time a need has existed for a more dependable volume measuring device than the sand pycnometer, as much difficulty has been encountered in obtaining suitable sand that will give accurate and consistent results. Field density readings taken with a pycnometer frequently run much higher than the dry optimum of the corresponding Proctor. The balance usually employed in this test will weigh to 0.01 lb., or less than 1 percent; therefore, the error is in the volume measurement.

An effort was first made without success to measure the volume of the hole by coating it with a thin film of tallow, and filling the hole with water from a burette; tiny pin holes left in the wax coat allowed some of the water to seep out. Several solutions and emulsions were tried with equally unsatisfactory results.

The next method employed a graduated cylinder filled with water and attached to a rubber balloon forming a closed system. This method worked so well, and is so easily operated, that it is recommended above all others. This apparatus consists of a 1,000-c.c. graduated cylinder fitted with a large wooden stopper or bushing and flange as shown by the accompanying drawing. The flange forms a top for the test hole. A thin rubber balloon is attached to the wooden bushing by drawing it on over the bushing's nipple, and securing it by a rubber band. Since the balloon is attached externally, it is easily changed.

Sponge rubber rings (much like piston rings) make the bushing water tight in the glass cylinder; the shoulder on the bushing acts as a stop when it comes in contact with the top of the graduate. The calibration mark, near the top of the cylinder, indicates the standard position of the water level with the graduate upright on its base. An air vent with a rubber tube and pinch cock are located near the bottom of the cylinder; this pinch cock should be placed as near as possible to the end of the vent.

This instrument was calibrated by inverting the cylinder and placing the rubber balloon into glass jars of known volumes. With the flange secure against the top of the jar, the balloon was forced to completely fill the volume of the container by applying a slight head of air above the water in the cylinder through the rubber tube, the entrapped air in the bottom of the jar being released through a tiny rubber tube. At this point the water level in the graduate was read in cubic centimeters.

This instrument with its case weighs 8 lb., the case being 18 in. high with a 6-in. base. It has a volume range from 0.0050 to 0.0332 cu. ft. As most of the parts are commercial products, they can be easily obtained. The wooden bushing and flange is the only part not available on the market; however, it may be readily turned out on a wood lathe. It is estimated that the apparatus can be made for $15 on a unit basis, and much less if turned out in quantity production.

In actual field tests the tiny rubber tube was found unnecessary. A graph was plotted with the cubic centimeter readings on the graduated cylinder as the abscissa and the cubical contents of the glass jars as the ordinate (Fig. 2). A straight line was drawn through most of these points. The volume readings, in cubic centimeters, were taken from this line to make up the conversion table. As the system is a closed one, it is unnecessary to calibrate the rubber balloon.—ROBERT MCGINN, *Assistant Airways Engineer, Civil Aeronautics Administration, Atlanta, Ga.*

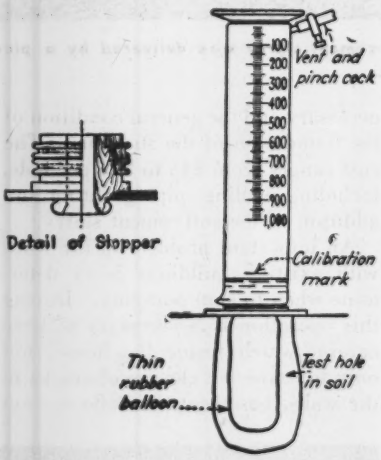


Fig. 1. An accurate volume measuring device of type above may be assembled at low cost.

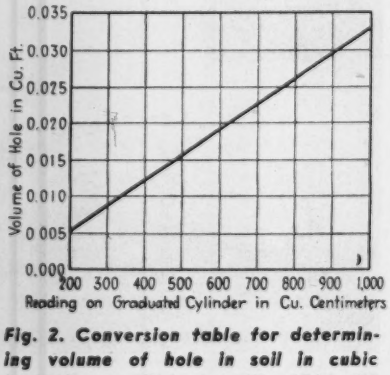


Fig. 2. Conversion table for determining volume of hole in soil in cubic feet when readings on calibrated cylinder are in cubic centimeters.

Nomogram for Stiffness Factors Speeds Up Rigid-Frame Calculations

By most methods, in the analysis of concrete rigid frames the relative stiffness factors $\left(K = \frac{I}{L}\right)$ of all members are needed before starting the analysis. The usual procedure, after assuming the size of members, is to compute the moment of inertia of each member, and then divide by the length. If a large number of frames, or frames consisting of a large number of members, are to be solved, much time can be saved by eliminating these routine computations through the use of the accompanying alignment chart, which gives directly to two significant figures the value of the relative stiffness factor $\frac{I}{L}$ for rectangular prismatic members.

The chart covers all columns, beams, or struts of rectangular shape and constant section throughout their length. Theoretically, the chart should not be used for T-beams, wedge-shaped beams, beams with curved

soffits, haunched beams, battered columns and circular columns. However, many designers either ignore the effect of haunching, or if they do consider it, merely multiply the stiffness factor by a constant picked out of a table or chart; therefore, the only types of members excluded in actual practice are circular columns and T-beams.

The range of sizes covered by the nomogram was determined by practical considerations. The member dimensions b and h vary from 10 to 50 in. The minimum column permitted under the Joint Committee Code of 1940 is 10 x 10 in., consequently 10 in. was chosen as the minimum dimension; the upper limit of 50 in. was chosen as a convenient figure well above the dimensions used in ordinary building work or on small bridges.

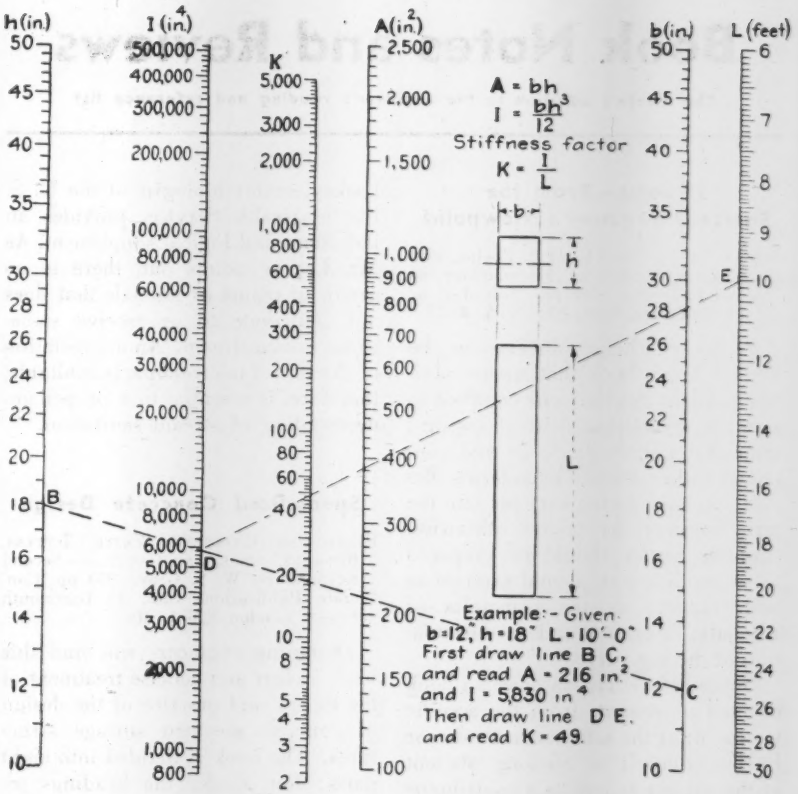
Use of the chart is illustrated by the calculations for a 12 x 18-in. column 10 ft. high, with bending moments in the plane parallel to the 18-in. dimension. To find I, draw a line from 18 in. on the h scale (Point B), to 12 in. on the b scale (Point C) and read $I = 5{,}830$ in.^{4} (point D). If desired, the area (A) may be read at the intersection of Line BC with the A scale.

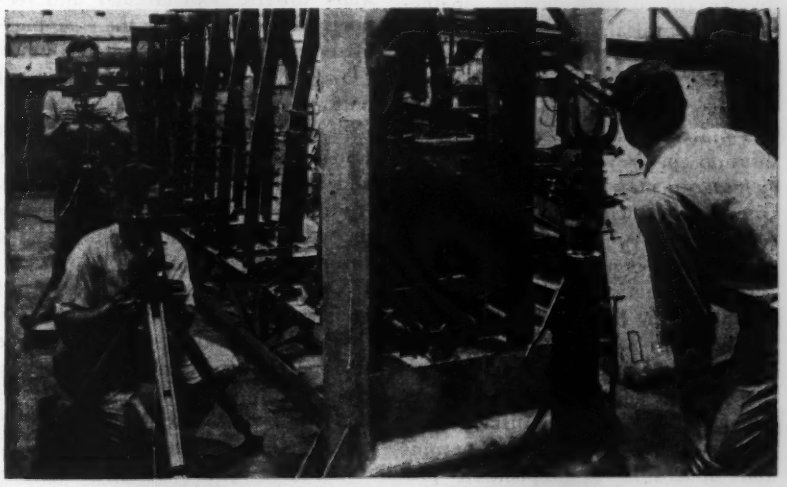
To find K draw a line from Point D on the I scale to 10 ft. on the L scale (Point E) and read $K = 49$ where Line DE crosses the k scale. To find the absolute stiffness $\left(4E\frac{I}{L}\right)$ multiply K by $4E$, where E equals the modulus of elasticity. The h scale must always be used for the the dimension parallel to the plane of bending moments.

In most analyses it is customary to use ratios of the stiffness factors. These ratios can be obtained by dividing all the stiffness factors, as read from the chart, by the smallest for the frame.

It should be noted that the use of the formula for moment of inertia $\left(I = \frac{bh^3}{12}\right)$ is a common approximation in rigid-frame design and represents a compromise between the two extremes of using either the full transformed section, or using the partial or "cracked" transformed section.

Frequently, after analyzing a frame, it is desirable to alter the stiffness of one or more members by a definite percentage. The chart will enable the designer to choose easily the new size of the member. For instance, if the stiffness and, consequently, the moment of inertia of the member in the above example is to be increased by 50 percent, multiply 5,830 x 1.5 to get $I = 8{,}750$. Using the point 8,750 on the I scale as a center, rotate a straightedge across the chart, until it intersects suitable values of b and h, such as 18 x 18 in., or 13 x 20 in.—HOWARD F. ECKERLIN, *Structural Engineer, Arthur G. McKee & Co., 2300 Chester Ave., Cleveland, Ohio.*





SURVEYOR'S TRANSIT USED ON AIRCRAFT PRODUCTION

Workers at the Los Angeles plant of Douglas Aircraft are using surveyor's transits to save many hours in the task of aligning production jigs. Formerly piano wires were stretched as vertical and horizontal guides, which required five or six hours. The use of transits permits the work to be done in less than 45 min.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Streams—From the Sanitary Engineer's Viewpoint

STREAM SANITATION—Earle B. Phelps, with a chapter on Stream Microbiology by James B. Lackey. 276 pp. Published by John Wiley and Sons, New York. $3.25.

Professor Phelps observes in the preface to his book that stream sanitation might appear to be confined to a rather specialized field of inquiry, somewhat narrow in scope and contained within definite boundaries. Before you have gotten very far into the text, however, he proves otherwise. And the reader should be prepared for some thorough mental exercise in such matters as the principles of adiabatic saturation and the formulation of the sag curve.

Never before has there been a book devoted to streams from the specific viewpoint of the sanitarian. Professor Phelps, himself a life-long student of the subject as well as a contributor to fundamental knowledge on which principles of evaluation have been established, is ideally qualified to correct this deficiency in sanitary engineering literature. Although his treatise is primarily a scientific one, he seasons it throughout with philosophic discourse, which acknowledges that stream sanitation involves more than precise, mathematical appraisal. Thus, in describing the pollution of streams from industrial waste discharges, he finds it opportune to remind his readers that this practice was termed disposal by dilution in New England, "in response, we may believe, to a nudge from the reputed New England conscience."

This book is not for those who expect information in sugar-coated capsule form. But if the need and desire exist for serious study of stream pollution and purification knowledge, there is no substitute for this text. Among other things, it discusses the biology of growth and decay, aerobic and anaerobic decomposition processes, the oxygen balance and the public health aspects of bacterial pollution.

A concluding chapter, on stream microbiology, prepared by James B. Lackey, senior biologist of the U. S. Public Health Service, provides an important and logical supplement. As Mr. Lackey points out, there is no group of plants or animals that does not contribute to or receive something from a stream. An appreciation of the role of microscopic inhabitants, therefore, is essential to a proper understanding of stream sanitation.

Specialized Concrete Design

REINFORCED CONCRETE WATER TOWERS, BUNKERS, SILOS, AND GANTRIES—Second Edition. By W. S. Gray. 230 pp. Concrete Publications Ltd., 14 Dartmouth Street, London S.W.1, 10s.

Designing engineers will find this work a clear and concise treatment of the theory and practice of the design of concrete elevated storage structures. The book is divided into eight parts; four under the headings indicated in its title, and four dealing with related subjects. Numerical examples illustrate most of the procedures. One of the books especially valuable features is its discussion and indicated solution of many of the small but troublesome problems peculiar to this field.

Design of conventional elevated water towers, both circular and rectangular, together with their supporting columns, is well presented. Domed roofs and hemispherical and conical bottoms are here included, together with an interesting discussion of heat transmission through concrete walls and the attendant resulting stresses. Addition of prestressed tank design procedure would have enhanced the value of this section.

The treatment of the design of bunkers is complete and informative. It includes small as well as large shallow bunkers, and coal bulkheads. Several examples of larger bunkers of the type used in the American coke-making industry, are included.

On the subject of silos, the author, possibly recognizing the uncertainty existing in the field of bin pressures, has limited himself to a full presentation of Janssen's solution and of Airy's formulas. He mentions only indirectly the great number of existing grain elevators and other storage silos designed by these theories and makes no reference to the methods, including the sliding form, used in their construction.

Normal procedure for the calculation of wind pressures on elevated structures is developed and its application to tanks and their supports is clearly indicated.

Principles of gantry design and construction details are discussed but design procedure is not illustrated. The theory of influence lines is nicely developed and examples of its application to continuous spans of varying lengths and moments of inertia are presented.

Cost estimating for this type of work and conveying machinery for stored materials are touched upon briefly. Remarks on construction methods, including plant, scaffolding, formwork and placing of reinforcing and concrete make interesting and profitable reading.

The book is a useful addition to design literature in its field. It would have proved of greater value if the author, evidently well versed in his subject, had, in a few instances, broadened the scope of his work.—*Reviewed by* RAYMOND L. BRANDES, *Chief Structural Engineer, The Nicholson Co., New York.*

New Engineering Books

AIR COMPRESSORS—By Eugene W. Feller. 460 pp. McGraw-Hill Book Co., New York 18. $4.50.

STREAM FLOW RECORDS—By O. W. Hartwell. 444 pp. New Jersey State Water Policy Commission, Trenton, N. J.

THREE QUARTERS OF A CENTURY—A souvenir book commemorating the 75th anniversary of the Geo. W. Rogers Construction Corp., Contractors-Engineers, New York.

Reports and Pamphlets

WEATHER HEADLINES IN OHIO—By George W. Mindling. Engineering Experiment Station, Bulletin No. 120. Ohio State University, 75¢.

UNEMPLOYMENT INSURANCE IN THE SECOND YEAR OF WAR—Annual Report, 1943, Department of Labor, New York, Albany, N. Y.

(*Continued on page* 166)

When Any Project Involves Concrete

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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAYS, TEXAS

OWNER: Texas State Highway Comm., Austin.

PROJECT: Grading, structures, concrete pavement and flexible base shoulders from 3.3 miles west of New Boston to DeKalb on U. S. Highway 82 in Bowie County, Tex.

CONDITIONS: Contractor to furnish all materials and complete work in 200 working days. Preference rating AA-3. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.10 per hour; semi-skilled, 65c.; and common, 50c.

BIDS: Seven bids were received October 24, 1944, ranging from the contract low of $369,792 to $507,408.

PARTIAL LIST OF BIDDERS:

1. Austin Road Co., Dallas, Tex. (contract) $369,792
2. Texas Bitulithic Co., Dallas, Tex. 371,981
3. Harrison Engr. & Constr. Corp., Kansas City, Mo. 375,949

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	13.59 ac.	$150.00	$100.00	$80.00
2. Common road excavation	117,499 c. y.	.32	.30	.28
3. Common borrow	24,850 c. y.	.30	.35	.28
4. Common channel excavation	5,120 c. y.	.43	.35	.28
5. Unclassified structural excav.	417 c. y.	3.50	2.50	1.50
6. Overhaul (yd. quarter-mile)	93,992 c. y.	.08	.10	.08
7. Sprinkling	4,552 M gal.	.50	.50	1.00
8. Rolling	979 hr.	5.50	5.00	4.50
9. Rolling	144 hr.	4.10	3.50	3.50
10. Salvage and repair flexible base	21,683 c. y.	.65	.42	.75
11. Concrete pavement	128,066 s. y.	1.80	1.87	1.89
12. Reinforcing steel for pavement	484,730 lb.	.05	.044	.04
13. Class A concrete	251.25 c. y.	32.50	36.00	32.50
14. Class A concrete (ext. struct.)	150.43 c. y.	35.50	40.00	37.50
15. Reinforcing steel	47,499 lb.	.056	.05	.05
16. 18-in. std. rein. conc. pipe	24 l. f.	2.10	2.20	2.80
17. 24-in. ext. str. rein. conc. pipe	242 l. f.	3.25	3.20	3.70
18. Remove old structures (bridges)	1 ea.	365.00	300.00	75.00
19. Remove old structures (culverts)	26 ea.	58.00	35.00	125.00
20. Remove old struct. (conc. walls)	8 ea.	45.00	20.00	25.00
21. Remove old struct. (conc. foundation)	1 ea.	25.00	20.00	35.00
22. Move drainage structures	16 ea.	28.00	20.00	25.00
23. Mulch sodding	19,360 c. y.	.80	.82	.75
24. Monolithic concrete curb	2,303 Lf.	.30	.25	1.00
25. Right-of-way markers	52 ea.	3.00	2.00	1.50

RAISING BRIDGE, INDIANA

OWNER: Indiana State Highway Commission, Indianapolis.

PROJECT: Raising steel girder structure and railroad tracks, and paving approaches at underpass where New York Central Railroad tracks pass over State Road No. 30, Fort Wayne, Allen County, Ind.

CONDITIONS: Contractor to furnish all materials and complete work in 150 calendar days. Rail and highway transportation facilities available. Reported wage rates are: skilled labor, $1.00; semi-skilled, 75c.; common, 65c.

LIST OF BIDDERS: (Engineer's estimate, $28,991)

1. L. W. Dailey Constr. Co., Fort Wayne, Ind. (contract) $28,028

Item	Quan.	Unit Prices (1)	(2)*
1. Class D concrete	99 c. y.	$50.00	$50.00
2. Special filling material	200 c. y.	3.00	2.00
3. Structural steel	9,620 lb.	.22	.25
4. Reinforcing steel	1,464 lb.	.10	.08
5. Reinforced concrete pavement	794 s. y.	4.00	4.00
6. Remove present structure (portions)	Lump Sum	750.00	800.00
7. Excavation, unclassified	116 c. y.	4.00	4.00
8. Raising bridge	Lump Sum	2,000.00	2,500.00
9. Pavement removal	794 s. y.	1.00	.75
10. Concrete sidewalk	15 s. y.	3.00	2.50
11. Adjusting manhole to grade	1 ea.	25.00	20.00
12. Remove portion present drainage system	Lump Sum	150.00	500.00
13. Rivets removed	34 ea.	1.00	1.00
14. Holes drilled	48 ea.	2.00	1.00
15. Unloading and placing embankment	800 c. y.	1.20	1.25
16. Unload and spread cinder ballast	600 c. y.	1.00	1.00
17. Raising and surfacing main track (6½-in. lifts)	1,740 l. f.	1.20	1.00
18. Raising and surfacing side tracks (6½-in. lifts)	890 l. f.	1.50	1.00
19. Replacing cross ties	80 ea.	3.00	1.25
20. Timber furnished	9.71 Mbm.	260.00	250.00
21. Grillage rails fabricated and erected	6.6 ton	100.00	150.00
22. Membrane waterproofing, Type A	250 s. f.	.30	.40
23. Membrane waterproofing, Type D	250 s. f.	.30	.40
24. 1½-in. mastic waterproofing	60 s. f.	.60	.40
25. 8-in. vitrified clay pipe	8 l. f.	2.00	1.00
26. 12-in. vitrified clay pipe	42 l. f.	2.50	1.00
27. 18-in. vitrified clay pipe	52 l. f.	4.00	3.75
28. 6-in. perf. vitr. clay pipe	437 l. f.	1.50	1.25
29. 8-in. perforated cast iron pipe	52 l. f.	2.80	3.50
30. Stone ballast	8 c. y.	4.10	4.00
31. Std. catch basin, Type C1	4 ea.	125.00	125.00
32. Manholes, Type B2	1 ea.	250.00	200.00
33. Special catch basin	1 ea.	250.00	300.00
34. Aggregate for subsurface drains	30 c. y.	4.00	2.00
35. Installing rail supports	Lump Sum	1,200.00	1,000.00
36. Standard signs (4x4-ft.)	12 ea.	30.00	30.00
37. Standard barricades	2 ea.	50.00	60.00
38. Sign standards	2 ea.	50.00	25.00
39. Porous backfill	16 c. y.	4.00	4.00

*Engineer's estimate

HIGHWAY IMPROVEMENTS, TENNESSEE

OWNER: Dept. of Highways and Public Works, State of Tennessee, Nashville.

PROJECT: Grading, drainage, and concrete paving LaFayette Street in Nashville, beginning at Eighth Avenue and extending 1,447 miles to the East City Limits.

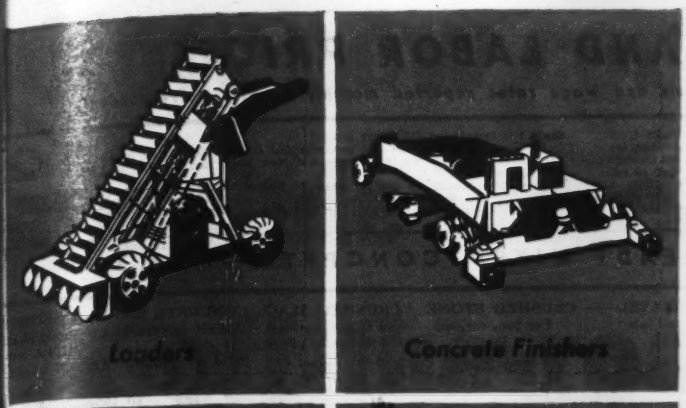
CONDITIONS: Contractor to furnish all materials and complete work in 225 working days. Wage rates specified are: skilled labor, $1.25 per hour; semi-skilled, 75c.; and common, 50c.

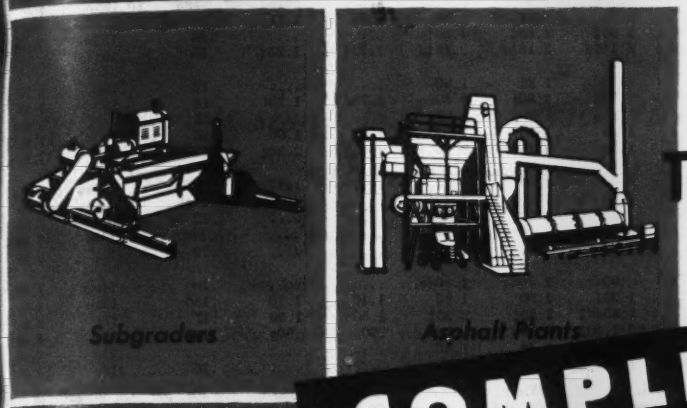
BIDS: Six bids were received September 1, 1944, ranging from the contract low of $410,799 to $677,171.

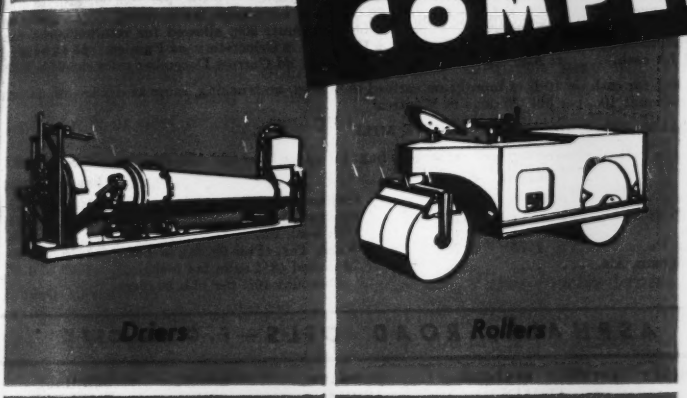
PARTIAL LIST OF BIDDERS:

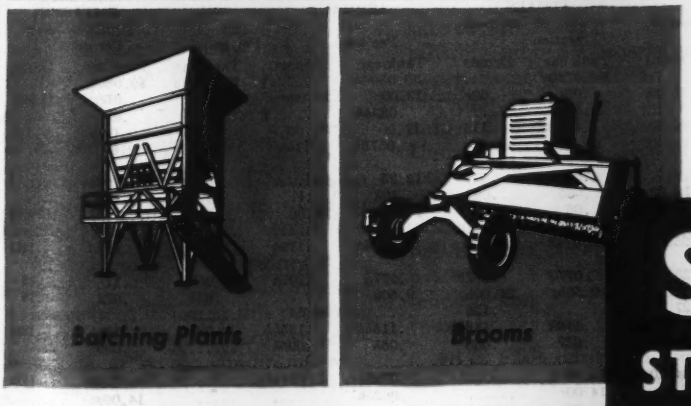
1. William F. Bowe & Co., Augusta, Ga. (contract) $410,799
2. Bowyer & Johnson, Jackson, Tenn. 435,266
3. Foster & Creighton Co. and Oman Constr. Co., Nashville, Tenn. 466,350

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	Lump Sum	$500.00	$16,000.00	$1,350.00
2. Roadway and drainage excav.	34,670 c. y.	.90	.88	1.65
3. Borrow excavation (common)	15,336 c. y.	.90	1.12	.90
4. Culvert excavation (unclass.)	6,206 c. y.	2.50	3.45	4.25
5. Sodding	12,790 s. y.	.60	.60	.60
6. Crushed stone (tr. bd. rdwy.)	170 c. y.	3.50	3.50	3.25
7. Cement conc. pavement, plain (9-in. uniform)	62,755 s. y.	2.78	2.88	2.92
8. Gray iron castings (Grade 1)	58,330 lb.	.09	.07	.07
9. Class A concrete	219.1 c. y.	40.00	40.00	35.00
10. Class B concrete	1.3 c. y.	50.00	40.00	40.00
11. Steel bar reinforcing	2,240 lb.	.07	.08	.08
12. 4-in. vitrified clay pipe	520 l. f.	.50	.50	.70
13. Brick masonry	71.98 M	85.00	67.00	75.00
14. Concrete sidewalk	99,722 s. f.	.28	.27	.25
15. Concrete driveway	11,718 s. f.	.36	.45	.40
16. Concrete curb	72.8 c. y.	35.00	35.00	30.00
17. Concrete comb. curb and gutter	1,320.2 c. y.	26.00	22.00	27.00
18. Water (for embankment)	270 M gal.	3.00	3.00	1.00
19. Concrete railroad crossing	83 s. y.	15.00	9.00	5.50
20. Remove, replace structures, etc.	Lump Sum	1,500.00	5,600.00	4,000.00
21. 12-in. pipe culvert	98 l. f.	2.00	1.93	2.00
22. 15-in. pipe culvert	1,445 l. f.	2.25	2.09	2.00
23. 18-in. pipe culvert	1,944 l. f.	2.75	2.45	2.30
24. 24-in. pipe culvert	1,789 l. f.	3.50	3.47	3.30
25. 30-in. pipe culvert	1,500 l. f.	5.60	4.35	4.30
26. 36-in. pipe culvert	100 l. f.	7.00	6.89	6.00
27. Dry excavation (bridges)	1,100 c. y.	2.00	3.00	2.00
28. Wet excavation (bridges)	82 c. y.	15.00	10.00	8.00
29. Rock excavation (bridges)	45 c. y.	15.00	15.00	13.00
30. Class S concrete (bridges)	17.2 c. y.	100.00	70.00	75.00
31. Class A concrete (bridges)	535.2 c. y.	45.00	47.00	50.00
32. Steel bar reinforcing (bridges)	50,473 lb.	.07	.06	.06
33. Rock drilling (bridges)	120 l. f.	1.50	1.50	1.00
34. 6-in. conc. sewer pipe (non-rein.)	50 l. f.	2.50	.70	1.60
35. 8-in conc. sewer pipe (non-rein.)	160 l. f.	3.00	.86	2.00
36. 3-in. pipe conduit (straight)	3,400 l. f.	.40	.40	1.00
37. 3-in. pipe conduit (90-deg. bend)	190 ea.	3.50	5.00	8.00
38. 2-in. pipe conduit (straight)	27,000 l. f.	.35	.35	.70
39. 2-in. pipe conduit (90-deg. bend)	81 ea.	1.30	4.00	6.00
40. Conc. street light base	71 ea.	35.00	44.00	37.50
41. Conc. traffic light base	40 ea.	35.00	40.00	37.50
42. Concrete pull box	1 ea.	35.00	115.00	180.00









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SOUND ENGINEERING PROVED PERFORMANCE

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

JANUARY CONSTRUCTION material prices and labor rates show only minor changes from the preceding month. Portland cement is up 9c. per barrel in Baltimore. In Los Angeles the December cement price in cloth was incorrectly quoted as $2.80. The correct December and January price is $3.20 per barrel. Ready-mixed concrete is 10c. per cu.yd. higher in Baltimore.

Iron and steel products are unchanged from last month except for a 1.1c. increase on shapes and a 2c. reduction on reinforcing bars in Detroit. Vitrified clay pipe and clay drain tile remains at December levels.

Lumber, both pine and fir, is unchanged from a month ago in all of the 20 cities. Structural clay tile rose in Chicago and New York, and common brick is up in Atlanta and Kansas City.

Common labor is up 5c. per hour in Baltimore, the new rate being 90c. per hour. Common labor on heavy construction which ranged from $1.15 to $1.25 in Cleveland, now ranges from $1.125 to $1.155. The plasterers' rate is up in Baltimore and Denver.

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT—Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted			SAND AND GRAVEL—Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block		CONCRETE Ready Mixed 1:2:4, over 50 c.y., del.
	Cloth a	Paper	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-grav.	Lt.wgt. Agg.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.17	....	$8.00
Baltimore	2.62	2.37	2.12	1.75‡	1.75‡	1.25‡	1.80‡	1.80‡	1.75‡	1.75‡	.125	$0.125w	7.45
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
Boston	2.97b	2.72b	2.52	1.50‡	1.50‡	1.05‡	1.25‡	1.35‡	....	....	.13	.155w	7.35m
Chicago	2.70	2.45	2.30	2.15‡d	2.15‡d	2.15‡d	2.15‡d	2.15‡d	1.75‡	1.75‡	.16	.16x	....
Cincinnati	2.41	2.16	1.96	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15w	6.70
Cleveland	2.49	2.24	....	1.75i	1.75i	1.55i	1.80i	1.80i	1.73i	1.73i	.14	.14	7.45
Dallas	2.52	2.27	2.07	1.50p	1.70p	1.10p	1.69p	1.79p	....	....	.15	....	6.20
Denver	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	....	7.25
Detroit	2.49	2.24	2.09	1.50	1.50	1.50	2.25	2.25	2.00‡	2.00‡	.13	.14w	7.15
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125wy	7.50n
Los Angeles	3.20ddp	2.60v	....	1.30	1.30	1.15	1.30f	1.30f	....	....	.04bb	.10cc	7.25
Minneapolis	2.90	2.65	....	1.00h	1.00h	.25h	1.00h	1.00h	....	....	.12	.16	7.35j
Montreal	....	1.95rs	1.79rs	1.65‡s	1.65‡s	1.50t	.80ct	.90ct	....	....	.14t	.14wt	7.85y
New Orleans	2.42	2.16	1.96	1.67	1.65	1.22	....	....	....	....	.19	....	9.25
New York	2.85‡	2.60‡	....	1.60de	1.60de	.90de	1.70de	1.80de	....	....	.16	.14wcc	7.50k
Philadelphia	2.73	2.48	2.28	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155w	8.45
Pittsburgh	2.55	2.30	2.10	1.65‡	1.65‡	1.85dd‡	2.25‡	2.25‡	1.50	1.50	.17	.17z	8.25
St. Louis	2.80	2.52	....	1.75‡	1.75‡	1.25/1.50‡	1.10h	1.10h	.90g	.90g	.145	.13w	8.00
San Francisco	2.21	2.01	1.71	1.36	1.36	1.36	1.46	1.46	....	....	....	.21y	7.55
Seattle	2.95o	2.75o	....	1.00o	1.00o	1.00o	2.00o	2.00o	....	....	.16	.16y	7.25

‡ Delivered. a 10c. allowed for each returnable bag. b 10c. per bbl. off for cash. c F.o.b. quarry. d Per cu. yd. e Barge lots alongside docks. f Crushed granite. g F.o.b. Granite City, Ill. h F.o.b. plant. i Within three miles of Public Square. j 5% discount for cash. k Discount of 2 percent for cash in 10 days. l Up to 200 cu. yd. m 50c. off for cash. n 25 c.y. or more. o 2% off for cash. p 10c. per ton off, cash 15 days. r 10c. per bbl. off, cash 20 days. s 8% sales tax included. t 8% sales tax not included. v 20c. per bbl. discount; 20c. allowed for returnable cloth bag. w Cinder. x Waylite. y Haydite. z Celocrete. aa Pumice. bb 4 x 8 x 12 in. cc Also 8 x 18 x 18 in. dd Correct December price should be $3.20.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICE BASES AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind.	$1.70	$1.65	Ironton, Ohio	$1.70	$1.65	Richard City, Tenn.	$1.80	$1.75
Dallas, Tex.	....	....	Limedale, Ind.	....	....	Steelton, Minn.	1.80	1.75
Hannibal, Mo.	1.70	1.65	Norfolk, Va.	....	....	Universal, Pa.	1.75	1.70
Hudson, N. Y.	....	....	Northampton, Pa.	1.75	1.70	Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.70
Independence, Kans.	1.70	1.65	North Birmingham, Ala.	....	....	Montreal (8% sales tax incl.)	1.68	1.67
						Discount 10c. per bbl. 20 days		

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICK AND BLOCK Granite per M. lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration Tank car	Drums	CUTBACK ASPHALT Per ton Tank car	Drums	ROAD OIL Per gal. Tank car	ASPHALT EMULSION (Quick-breaking) Per gal. Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.53e	.....†	$0.0740e	.....†	$0.0806he	.....†	$0.0781e	$0.0806	.....†
Baltimore	150.00‡	49.00	85.00m	15.00r	21.00r	.06r	.09r	13.00r	23.00r	.065r	.07r	.14r
Birmingham	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834h	.....†	.065	.09	.....†
Boston	85.00	59.00	3.75	15.00	24.00	.0625	.115	17.00	30.00	.0625	.0825	.145
Chicago	150.00	55.00	2.50/2.80d	14.00	22.50	13.00g	21.50g	.0575h	.15h	.05n	.09/10n	.13/.15n
Cincinnati	120.00	53.75	.....	17.00	.....	.085	.....	12.25	.....	.07	.085	.....
Cleveland	120.00	37.25	2.50	17.00	19.00	.085	.095	.10h	.11	.10	.10	.....
Dallas	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	16.11	.....	11.00	.....	10.00	.....	.045h	.....	.....	.....	.....
Detroit	.....	37.00	.....	18.06f	25.60f	.0743	.128	.0718h	.119h	.067	.0775	.1149
Kansas City	.....	44.00	.....	18.50	23.50	.077	.1075	.077h	.107h	.057	.11	.15
Los Angeles	.....	50.00	.....	9.00b	23.00	9.50bg	24.00bg	9.50b	.....	.025	.072	.15
Minneapolis	.....	.....	2.30d	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
Montreal	92.40	.....	.....	16.60k	24.25k	.116k	.1485k	.115hk	.135hk	.08k	.135k	.188k
New Orleans	.....	.....	.....	13.50a	20.00a	.057	.088	.06h	.095h	.....	.080	.....
New York	.....	65.00	.....	17.40	24.20p	14.00	.....	.0725h	.1325hp	.....	.0725p	.119p
Philadelphia	140.00	58.00	4.06	15.00r	.....	14.00r	.....	.0625h	.....	.....	14.00qr	.....
Pittsburgh	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
St. Louis	.....	39.00	.....	16.00	22.00	15.00g	21.00g	.0575h	.1212h	.648	.06	.11
San Francisco	.....	45.00	.....	10.90	21.15	10.90g	18.00qr	12.90	17.50r	9.50qr	.0525	.1125
Seattle	.....	.....	.....	10.90i	23.40i	.....	20.40qi	11.40i	.....	.....	.0525i	.0625

‡ Delivered. a F.o.b. Baton Rouge. b Delivered to purchaser's warehouse. c 3½x4x8½ in. d 2½ in. 12-lb. treatment. e Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. f Mexican. g Per ton. h Per gallon. i F.o.b. Martinez. j 3x3½x8½ in. k Tax included. m Per thousand. † Available on priority only and quoted specially. p No steel drum shipments except to armed forces. r February 1943 prices, none later available.

How new construction principle increases life of off-the-road tires

Service reports show B. F. Goodrich tires last far longer than other makes

A NEW principle in building off-the-road tires is increasing the life for B. F. Goodrich tire users on jobs throughout the world. Here is a letter received from a B. F. Goodrich field tepresentative:

"We have just received a report on the performance of 18.00-24 20-ply Universal tires used on bottom dump Euclids in a coal stripping operation. The following is a record of hours of service for four tires recently removed:

Tire 218 4269 hours
Tire 217 4327½ hours—this tire was too slick for traction and will be mounted later on a trailer wheel for further service.
Tire 173 4212 hours
Tire 190 4060 hours
Tire 181 One of the first two Universal tires put in operation by this firm now has over 4600 hours of service on it and is still going strong.

"Incidentally, before using our Universal tire, this company had an expectancy of 2500 hours of service on this size tire."

Strip-mine operator writes

A northern Michigan and Minnesota operator handling iron ore wrote us direct as follows:

"Since January, 1941, mainly B. F. Goodrich Rock Service and Universal tires have been in use at this property. These tires have given utmost satisfaction under severe conditions with percentage of failures so relatively small that it may be disregarded."

Far greater mileage

Here are some mileage records received from other contractors: 17,226 miles from B. F. Goodrich tires compared with 12,501 for the best of all three ordinary tires used; 15,017 miles compared to 11,304 for the best ordinary tire; 17,599 miles compared to 6476 for the best ordinary type.

These reports are not exceptional. They cover, of course, tires made entirely of crude rubber. Tires containing some synthetic may not last as long, but the superiority of B. F. Goodrich tires will probably still be just as great because of the new construction features described below. In almost every case where accurate service records are kept B. F. Goodrich off-the-road tires show up best.

Tires bruise-protected

One of the reasons for this superiority is the bruise-protection built into the tires of 11.00 cross section and larger. Under the tread are four breakers insulated with thick layers of shock-resisting rubber. Cords in each of the two pairs of breakers run in the same direction so they will flex in unison rather than rub against each other. Under impact the cords stretch and return to their original position, distributing the force of the blow and allowing it to be absorbed by the rubber between them. Thus the shock passed on to the cord body is greatly reduced and there is less chance of bruise-breaks and ply separation.

All B. F. Goodrich off-the-road tires are made with special rubber compounds which resist cutting.

All in all there are five different tread designs offered, each designed for maximum service on a particular type of operation.

←The Universal
—for two-way traction and maximum resistance to the abuses of rocky surface hauling.

The Rock Service→
—for sure-footed traction in mining, quarrying, and general contracting.

←The Super Traction
—for earth-moving tractor wagons and trailers.

The Earth Mover→
—for free-rolling wheels on scrapers and trailer wagons.

←The All-Purpose
—for combination off-the-road and on-the-road service. Combines super-traction and long mileage.

Each of these tires has a tread designed to give superior wear in the service for which it was intended.

Make this test

We urge every user of off-the-road equipment to try B. F. Goodrich tires alongside of other makes. Keep accurate service records. Compare natural rubber tires with natural rubber, synthetic with synthetic, and prove to yourself that you can save money with B. F. Goodrich tires.

Supplies of most sizes of these tires are strictly limited. It is well to place tentative orders early. See the local B. F. Goodrich dealer for information, or write us direct. The B. F. Goodrich Co., Akron, Ohio.

B.F. Goodrich
Truck & Bus Tires

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	STEEL RAILS Per Gross Ton Light	STEEL RAILS Per Gross Ton Re-rolled	TRACK SUPPLIES Angle Bars	TRACK SUPPLIES Std. Spikes *c*	TRACK SUPPLIES Tie Plates	TRACK SUPPLIES Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	3.05	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq. ft., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.40	$2.40	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
Boston	3.912	3.994	....	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.77
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1566	....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.00	1.66	1.25	.1566	....
Dallas	4.25	3.17	3.17	.....	....	25.00	27.50	1.93	1.42	.1827	....
Denver	4.57	3.33*k*	....	.....	....	26.50	26.50	1.97	1.45	.186	....
Detroit	3.661‡	2.50‡	2.50‡	.....	.10	30.00	30.00	1.68	1.26	.1584	2.66
Kansas City	4.19	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683	2.874
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701	2.73*d*
Montreal	3.95*i*	2.90*i*	2.80*i*	.....	....	31.00*hi*	46.00*hi*	2.76	3.44*i*	.282*i*	....
New Orleans	4.229‡*k*	2.52	2.52	.05	.10	19.00	21.00	1.82	1.35	.1715	2.873
New York	3.75	2.76*c*	2.76*c*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.666	3.668	....	.....	....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	2.675	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.70
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	.1827	2.95*e*

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *k* Quotation on changed basis; no actual price change.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Black %	Galv. %	Butt Weld 3½ to 6 in.; Black %	Lap Weld Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525*c*	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.70	7.25	160.00	200.00	.60	1.85	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.371*r*	.7155*r*	2.79*r*	7.6875*r*	170.00‡*r*	265.00‡*r*	.60	1.95	....	....	....	....
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00‡*s*	170.00‡*s*	.75*t*	1.75*t*	57.1	43.4	54.0	39.6
Cleveland	54.75	.266*r*	.513*r*	2.115*r*	5.535*r*	90.60	139.40	.36	1.38	68.5	57.5	66.0	54.5
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	47.2
Detroit	54.75	.385	.7425	2.925	7.75	170.00*u*	260.00*u*	.36	1.75	57.6	44.0	54.5	40.2
Kansas City	55.73	.35	.59	2.20	6.20	140.00	260.00	.45	1.60	35.9	46.4	46.6	59.9
Los Angeles	68.40	.325†	.585†	2.70†	6.75†	130.50	217.50	1.00	2.00	61.1	50.1	58.6	47.1
Minneapolis	59.10	.305†	.549†	2.196†	6.25†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2
Montreal	67.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.37*r*	.78	1.69	....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3
New York	52.40	.308	.594	2.52	6.45	.....	.....	.60	1.40	64.9	53.9	62.4	50.9
Philadelphia	51.00	.35	.675	2.75	7.50	165.00	225.00	.45	1.75	56.6	42.8	53.6	39.1
Pittsburgh	56.00	.266†	.513†	2.295†	5.945	97.80	154.20	.85*q*	2.00*q*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	53.62	.32	.576	2.304	6.00	100.00	260.00	1.00*j*	2.00*k*	56.4	42.6	52.5	38.4
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	26.0
Seattle	70.20	.40	.72	2.88	7.20	115.20	.....	.51*f*	1.44*f*	....	....	....	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N. J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional. 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92 3 per cent tax on transportation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base. Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50%. *p* Less 53%. *r* Truck delivery. *s* Price quotations on delivered basis since Mar. 1940; current f.o.b. price $84 for 6 in.; $130 for 8 in. *et* Reinforced pipe prices since May, 1937; current plain pipe prices are: 12 in., 36c.; 24 in., $1.50. *u* Scarce; carload quantities not readily available.

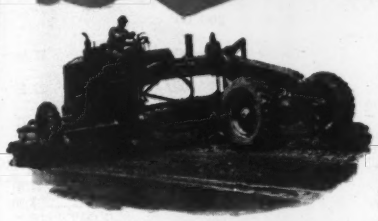
BUILT to outperform

● Exclusive features that save time and money by getting the job done better and quicker. "Plus values" built into every Austin-Western machine... values accumulated by engineering experience that has lived close to road building and earth moving problems and practices since the first crude Austin-Western tools of 1859.

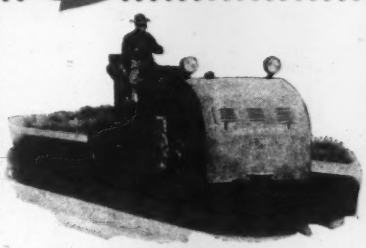
Features of design and construction "job tested" before the war... that have met the acid test of service on far-flung war fronts.

Your post-war Austin-Western machine may, or may not, resemble the model of today; but of this you can be sure... it will embody all the performance features of yesterday that have measured up to today's infinitely higher standards, PLUS everything that today is teaching us for tomorrow. More than ever it will be "Built to Outperform."

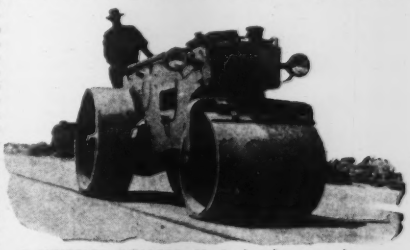
AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.



MOTOR GRADERS—Exclusive All-Wheel Drive and All-Wheel Steer enables the "99-M" and "88-M" completely to outperform ordinary motor graders.

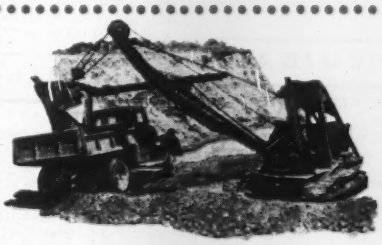


TANDEM ROLLERS—Made in 2 sizes—5 to 8-Ton and 8 to 10½-Ton. The variable weight feature enables one machine to handle a wide variety of jobs.

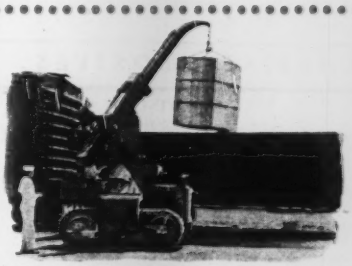


3-WHEELED ROLLERS—Made in sizes ranging from 6 to 12 tons. Gasoline or diesel engines. Hydraulic power steer. Hydraulic scarifier attachment.

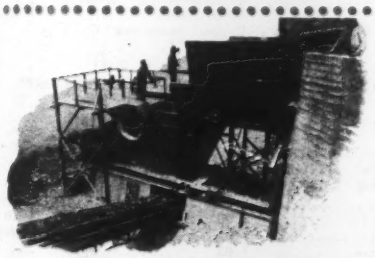
PATROL SWEEPER—Compact, simplified, quick-dumping. Rear broom throws dirt directly into hopper. May be had with Leaf Broom attachment.



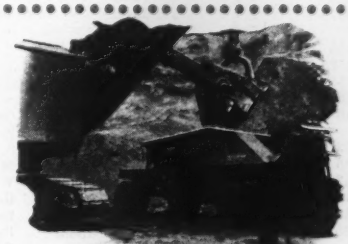
BADGER SHOVEL—Convertible to crane, dragline, piledriver, trench hoe, and skimmer. ¾-swing design has many operating advantages.



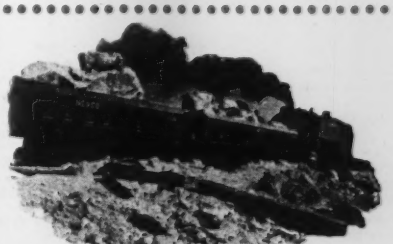
HYDRAULIC CRANE—Retractable-extensible boom provides ability to lift and carry maximum load under such handicaps as low doors and ceilings, inside box cars, etc.



CRUSHING EQUIPMENT—Roller bearing jaw crushers and roll crushers in a wide variety of sizes. Portable and semi-portable crushing and screening plants for all purposes.



TRAIL CARS—Hopper-bottom and side-dump types. Designed for heavy duty haulage behind powerful truck-tractors, in open pit mines, quarries, etc.



DUMP CARS—Side-dump models built in capacities up to 50 yds. (level full), and 90 tons; in standard, narrow and foreign track gauges. Also hopper type, bottom-dump cars.

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better end for No. 1 N. C. Box. (Prices in Bold Face)									LONG LEAF Y. P. Merchantable grade		PLYWOOD Rail freight increment (See note for base price)	
	All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)									up to 20 ft.			
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 R/A	6x12 R/A	12x12 R/A	2x12 R/A	12x12 R/A	⅝"	¾"
Atlanta	**$40.00**	**$40.00**	**$32.00**	**$35.00**	**$34.00**	**$37.00**	**$46.00**	.....	.....	$57.00	$64.00	$17.30	$21.85
Baltimore	**44.00**	**46.00**	**44.00**	**46.00**	**47.00**	**52.00**	**65.00**	.....	.....	115.00	120.00	18.25	22.25
	48.00	*49.00*	*55.00*	*55.00*	*55.00*	*57.50*	*68.00*	*$75.00*	*$75.00*	.....	.....	.....	.....
Birmingham	**45.00**	**45.00**	**44.50**	**43.50**	**44.50**	**47.50**	**68.00**	**55.00**	**56.00**	.....	.....	17.35	21.15
[1]	**50.00**	**50.00**	**49.50**	**48.50**	**49.50**	**52.50**	**72.00**	.....	.....	67.50	70.00	.....	.....
Boston	60.00[3]	60.00[3]	60.00[3]	60.00[3]	60.00[3]	62.00[3]	66.00[3]	.....	.....	58.00[3]	58.00	18.25	22.23
	55.00	*55.00*	*54.00*	*54.00*	*54.00*	*54.00*	*58.00*	*58.00*	*58.00*	.....	.....	.....	.....
Chicago	**54.00**	**54.00**	**55.00**	**54.00**	**54.00**	**60.00**	**68.00**	.....	.....	80.00[k]	95.00[k]	14.50	17.80
	55.00	*55.00*	*54.00*	*54.00*	*54.00*	*55.00*	*66.00*	*66.00*	*67.00*	.....	.....	.....	.....
Cincinnati	**47.50**	**49.00**	**42.50**	**42.50**	**42.50**	**44.50**	**67.00**	.....	.....	65.00	65.00	17.35	21.13
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	**42.50[k]**	**42.50[k]**	**52.50[k]**	**51.00[k]**	**65.00**	**65.00**	**83.00**	**83.00**	**83.00**	.....	.....	17.75	21.80
Dallas	**45.25**	**45.25**	**44.50**	**43.00**	**43.00**	**47.25**	**60.75**	**58.75**	**58.75**	88.75	85.00	14.80	17.80
Denver ‡	63.50[4]	62.00[4]	65.00[4]	65.00[4]	65.00[4]	66.00[4]	69.00[4]	*83.00*	*89.00*	.....	.....	10.45	12.70
Detroit	**61.00**	**61.00**	**57.75**	**57.75**	**57.75**	**63.75**	71.00	.....	90.00	70.75	90.00	17.35	21.13
	57.00	*57.00*	*57.00*	*57.00*	*62.75*	*72.75*	*75.00*	*75.00*	*90.00*	.....	.....	.....	.....
Kansas City	**69.00**	**69.00**	**67.00**	**65.50**	**67.00**	**69.00**	**84.00**	.....	.....	84.00	94.00	12.90	15.40
	66.00	*66.00*	*59.50*	*59.50*	*59.50*	*59.50*	*75.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles [a]	*60.00*	*60.00*	*60.50*	*60.75*	*59.25*	*59.25*	*72.75*	*72.00*	*72.00*	.....	.....	9.90[g,h]	12.05[g,h]
Minneapolis ‡[b]	59.00[4]	59.00[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	15.40
‡	*58.00*	*58.00*	*57.00*	*57.25*	*56.25*	*57.00*	*64.75*	*63.50*	*63.50*	.....	.....	.....	.....
Montreal ‡[7]	*58.00*	*61.00*	*54.00*	*58.00*	*60.00*	*66.00*	.....	.....	.....	200.00	200.00	.....	.....
	54.00	*54.00*	*57.00*	*57.00*	*57.00*	*58.75*	*62.00*	*62.00*	*62.00*	.....	.....	.....	.....
New Orleans	**40.00**	**40.00**	**37.00**	**35.00**	**34.00**	**36.00**	**46.00**	.....	.....	55.00	69.00	14.80	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	.....	.....
New York	**67.50**	**67.50**	**62.50**	**62.50**	**62.50**	**64.00**	**74.00**	.....	.....	120.00[f]	125.00[f]	18.35	22.23
‡	.....	.....	*66.00[i]*	*66.00[i]*	*66.00[i]*	*66.00[i]*	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	.....	.....	130.00	130.00	18.25	22.23
	75.00	*75.00*	*75.00*	*75.00*	*75.00*	*75.00*	*85.00*	*90.00*	*90.00*	.....	.....	.....	.....
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	.....	.....	.....	.....	18.10	22.03
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*82.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis ‡[c]	**61.00**	**61.00**	**57.00**	**56.00**	**57.00**	**59.00**	**71.00**	*75.00*	*75.00*	87.00	87.00	14.60	17.80
San Francisco [d]	*41.00*	*41.00*	*36.50*	*36.75*	*35.75*	*35.75*	*37.50*	*36.00*	*36.00*	.....	.....	7.30[j]	8.90[j]
Seattle	*45.50*	*45.50*	*44.50*	*44.50*	*43.25*	*43.25*	*43.50*	*43.00*	*41.75*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers, N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. [5] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅝", $95.15; on ¾", $104.85; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price. *k* August 1943 price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	77-10%	77-10%	.15	
Cleveland	77%	77%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	77-10%	77-10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40-5%*ab*	47%*ac*	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77-10%	77-10%	.155	
San Francisco	66%	73%	.155	
Seattle	75%	75%	.1575†	

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Discount from list Sept. 1939; sales tax included, but 6% tax exemption not allowed for. *b* Single thickness. *c* Double thickness. *d* Discount from jobbers' list Sept. 15, 1928.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal St. add delivery charge of $6.00 per trip. [1] F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla and Maine.	.11 -.1175	.135 -.1475	.155 -.1675
Rocky Mtn. States	.11 -.1225	.135 -.1525‡	.155 -.1725‡
Pacific N. W. States	.1075-.12	.1375-.15	.1575-.17
Pacific S. W. States	.1050-.1125	.135-.1425	.155-.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail — Pine*	By Rail — Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.34	....
12 in.— 2 ft. from butt	6-in.	50 to 59-ft.	.35	....
12-in.—2-ft. from butt	6-in.	60 to 69-ft.	.36	....
12-in.—2-ft. from butt	6-in.	90 to 100-ft.	....	.515
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.565
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.41	.62
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.43	.59
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.53	....
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.56	....
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.61

* Pine piling over 80-ft. available only in limited quantities.

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.00*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.42	3.58
Birmingham	White Oak	1.00	1.60*a*	....	2.25*a*
Chicago	Red Oak	....	2.00/2.25*a*	....	2.87/3.00
Los Angeles	Douglas Fir	2.00	3.25*a*	2.90	4.20*a*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*ag*
St. Louis	White Oak	1.63	....	2.19	....
	Red Oak	1.63	2.20*a*	2.19	3.04*a*
	Sap Pine or Cypress	1.70	....	2.06	....
San Francisco	Douglas Fir	1.25*bef*	....	....	3.00*cef*
Montreal	Birch or Maple	.85	.95	.... †	.... †

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6"x8"x8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January 1943 price, none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb.	$2.50- 3.10
Chlorine cylinders, liquid, per lb., delivered	.0525
Calcium chloride, 77-80%, flaked, 100-lb. paper bag, del'd, ton	18.50-35.00
Silicate of soda, 52 deg. in drums, f.o.b. works, per 100 lb.	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00-25.00
Sulphate of copper, in bbl., per 100-lb.	5.00

This fight is over

Wires and strands work together instead of against each other in *PREFORMED* YELLOW STRAND . . .

Don't get us wrong. The fight you *want* in *Preformed* Yellow Strand is there. It fights wear . . . delay . . . excessive wire rope costs.

But no one wants fight *inside* a rope—the wasteful stresses that result when springy wires and strands are twisted into place and kept there by force. Such straining parts are bound to lower the efficiency of an unpreformed rope.

This condition is corrected in the making of *Preformed* Yellow Strand. A patented process *preforms* each strand . . . sets both the strand and its wires to the curvature needed in the finished rope. The parts don't fight . . . they *fit,* as the illustration shows.

With internal conflict under control, a rope has little reason to stiffen, kink or squirm. So *Preformed* Yellow Strand is flexible and easy to manage. It is better prepared to withstand bending fatigue. It spools evenly . . . requires less breaking-in . . . increases safety . . . lasts longer.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

ARMY E NAVY

BRODERICK & BASCOM

Yellow Strand

PREFORMED WIRE ROPE

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity, Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload lot, Pulverized, or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$17.00	$20.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	300.00	16.00*k*	20.00*k*	18.00	13.00	2.50*m*
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25*o*
Boston	103.75*a*	110.65*a*	207.45*a*	248.90	.....	.....	20.00*i*	20.00*i*	21.00†	.....	16.00
Chicago	79.50	85.00	160.00	197.00	243.00	278.00	15.00	16.00	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	25.75	25.75	15.50	13.00	.....
Cleveland	71.25	76.20	125.50	150.60	201.90	231.15	20.00	20.00	15.75*j*	13.25*j*	3.50*r*
Dallas	67.90	73.25	145.80	174.96	227.62	281.72	15.25*i*	16.75*i*	19.00	15.00	15.00
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00*j*	17.00*j*	20.00*j*
Detroit	92.70	96.70	181.20	206.75	267.50	306.00	22.25	22.25	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	17.00	18.00	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	87.00*b*	92.80*b*	157.30*b*	.....	189.00*b*	262.00*b*	25.50	27.50*g*	21.00	16.00	19.00
Montreal	94.55*a*	100.45*a*	199.50*a*	160.45*a*	109.40*at*	137.40*au*	21.08†*u*	28.35†*u*	24.60*u*	18.00*u*	20.00*u*
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.30
New York	90.80	96.80	133.10*e*	219.80*h*	269.80*h*	333.90*h*	17.50/18.50	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	204.60	252.00	312.00	17.00	20.00	19.00	16.00	15.00
Pittsburgh	72.85	78.55	147.25	163.75	217.50	231.00	20.50	22.50	17.90	15.40	2.55*m*
St. Louis	67.00	72.00	130.00	190.00	244.00	290.00†	20.50	19.50	22.00	18.00	2.50*m*
San Francisco	96.00	108.00	144.00	108.00*t*	.....	.....	21.50	.....	24.00	23.00	2.50*m*
Seattle	115.00	125.00	230.00	.....	.....	.....	20.50*f*	24.00*f*	20.00*s*	20.00*s*	20.00*s*

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only, *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 days. *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax included. *v* 6x12x12-in. *w* Per 220 lb. bag. *x* Sept. 1944 prices, Oct. not available on tile.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

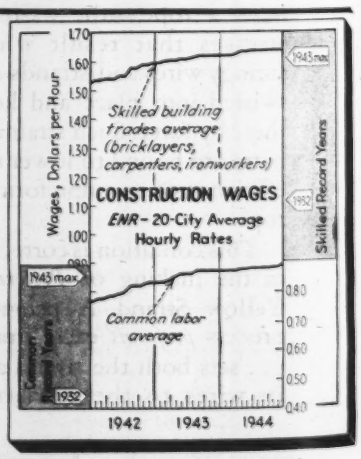
	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *b*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.10	2.03	2.03	.32	28.35
Boston	10.00	13.75	1.75	2.50	2.31	2.00‡*h*	3.30‡*us*	3.30‡*us*	.25‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00*f*
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.20	2.10*h*	2.10*h*	.33	25.00
Cleveland	10.00	13.75	1.70	2.90	1.60	1.93	1.83*h*	1.83*h*	.25	27.00
Dallas	10.00	14.50	1.88	2.11*n*	.05*l*	1.75*h*	1.68*h*	1.68*h*	.35	39.00
Denver	10.50	14.25	....	....	.27*l*	2.45	2.95	2.95	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.25	2.25	2.25	.50	23.00
Kansas City	10.00	13.875	2.30*g*	2.55*gr*	2.16*g*	2.19	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.8025*i*	1.7098*hi*	1.7098*hi*	.32	23.00
Montreal	11.65	14.65	2.50*p*	4.90*p*	3.15*p*	4.02*t*	2.58*t*	3.01*t*	.89*t*	2.10*t*
New York	10.00	13.75	2.03	....*r*	1.82	1.7098	1.6273*o*	1.6273*o*	.26	23.00
Philadelphia	10.00	13.75	1.60/1.80	2.20*r*	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.84*h*	1.84*h*	.34	26.00
St. Louis	10.00	13.75	2.28*s*	2.80*s*	1.96*s*	1.75	1.75	1.75	.33	23.00
San Francisco	10.25	14.00	1.80	2.75*n*	1.35	1.71	2.40	2.40	33	20.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May, 1941 price. *o* 60-lb. roll. *p* Plus 8% sales tax. *r* Not available, except on priority rating; then quoted specially. *s* December, 1942 price. *t* Federal tax included. *u* 90-lb. roll. *v* Truck delivery.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor—Building	Common Labor—Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.4375	1.80	1.625/2.00	1.725	.80	.80
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.50/1.875	1.667	1.00	1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.875	1.50	1.675	1.40/1.55	1.625	.85	.85
Cleveland	1.875*c*	1.575	1.875	1.875	1.875	1.085	1.125/1.155
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65*b*	1.50*b*	1.50*b*	1.50/1.625*b*	1.50/1.65	.80*b*	.80*b*
Detroit	1.725	1.50	1.825	1.675/1.825	1.725	.90/100	.90
Kansas City	1.65	1.50	1.625	1.675	1.70	.975	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.625	1.44	1.625	1.50	1.625*e*	.95	.95
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.10*f*	1.00
Philadelphia	2.00	1.58	2.00	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	1.00	1.00
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	1.00	1.00
Seattle	1.845	1.565	1.745	2.00	1.865	1.145	1.145
Montreal*	1.05	.95	1.00	.90	1.00	.60	.65

b 7 hr. day. *c* Prevailing rate on government work. *e* 35 hr. wk. *Cost of living bonus now included in basic wage.



ENR Skilled Average; (Bricklayers, Carpenters, Ironworkers) $1.641.
ENR Common Average; $0.891.

SMITHway CERTIFIED ELECTRODES... *made by welders... for welders*

SIGNAL CORPS PHOTO

NINE LST CONTRACTORS • ALL USED SMITHway ELECTRODES

WHEN nine big Midwest contractors tackled the gigantic landing-ships production program, there was no guesswork. All nine, of their own accord, chose SMITHway Certified Electrodes . . . developed and proved in the huge A. O. Smith plants, where millions of SMITHway Electrodes are used in welding more than 50,000 tons of steel products a month. No other electrodes offer such outstanding performance proof, over a period of many years of mass production.

WRITE FOR CATALOG!

New steels, involving new welding problems, are finding broader fields of application where strength with light weight is required. Be prepared to make the most of welding as a production tool on a thoroughly scientific basis. SMITHway Certified Electrodes provide a variety of accurately controlled analyses for dependable results — proved so, in our own welding shops where many complex alloys are daily being welded in production.

Have You Bought That Extra War Bond This Month?

Mild Steel . . . High Tensile . . . and Stainless Steel
WELDING ELECTRODES

SMITHway A. C. Welding Machine saves power; eliminates arc blow.

SMITHway Welding Monitor trains welders faster.

A. O. SMITH Corporation
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(Continued from page 92)

Engineers will foster Russian trade relations

To further the interests of the construction industry in connection with American-Soviet trade, engineers are invited to participate in the activities of the Architects Committee of the National Council of American-Soviet Friendship. At a meeting held at the Iranian Institute in New York City recently Harvey Wiley Corbett, well-known architect and chairman of the committee, explained the purpose and activities of the organization to a group of engineers and building products manufacturers and urged them to persuade their colleagues to join in this venture.

The committee was formed some time ago by leading architects to foster among Americans an understanding of Russia's building and planning experience and of her reconstruction problems. and to inform Russians more closely on American building activity. Such a mutual understanding is considered a prerequisite to a full development of American-Soviet trade and cultural relations, in which the building industry can be expected to play a leading role. In this work the committee has the close cooperation of the Architects Committee of the Society for Cultural Relations with Foreign Countries, the Moscow counterpart representing Soviet builders.

The Architects Committee of the National Council of American-Soviet Friendship is already at work in collaboration with the U. S. Office of War Information on a large exhibit of American building for showing throughout Russia to stimulate interest in American products, building and engineering methods. Further details may be obtained by writing to the committee at 232 Madison Ave., New York 16, N. Y.

Tampa Bay is surveyed for bridge or tunnel

Whether a bridge or a tunnel across lower Tampa Bay is most practical in providing for a crossing for vehicles will be determined by the engineering firm of Bail, Horton and Associates, of Ft. Myers, it was announced Dec. 20 by E. L. Cole, chairman of the port authority of St. Petersburg, Fla.

The firm is to make a complete survey of the lower bay and will make a report recommending either a bridge or a tunnel, with estimates of the cost of each. The firm is to receive $30,000 for the work.

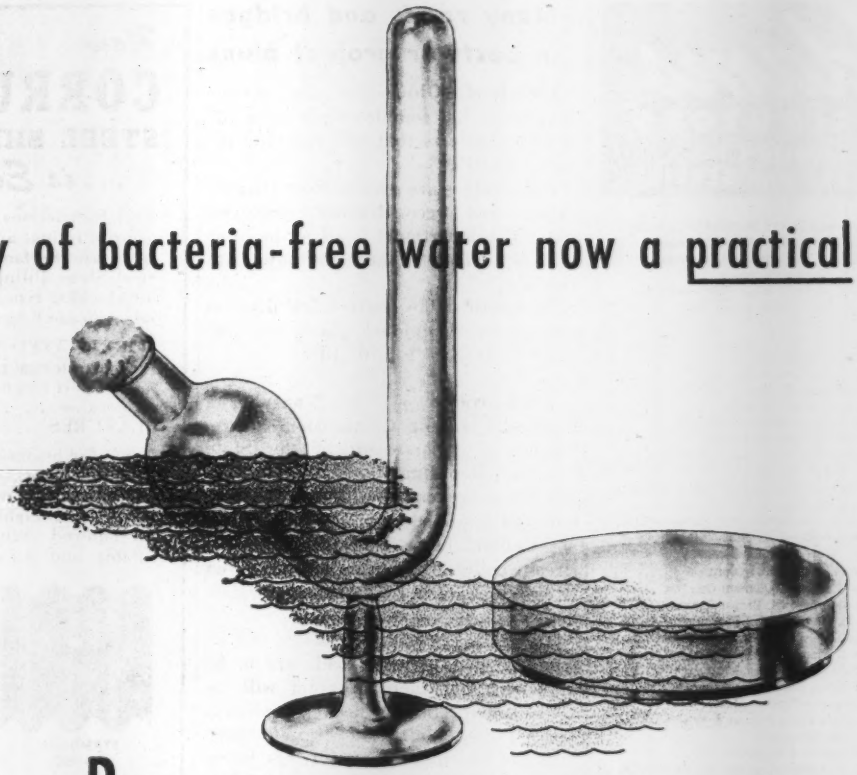
Cole said the survey would be so complete that there should be no unanswered questions regarding the feasibility of a bay crossing, the best type of crossing and the cost. All decisions will be in accordance with state and federal road department requirements.

PARSONS
250 TRENCHLINER

To suit varying job specifications, the digging depth of the Parsons 250 Trenchliner can be quickly adjusted to 6, 7, 8, 9, 10, 11 or 12 feet. Changes are made by lengthening or shortening the telescopic boom. Whether operating with boom telescoped to the shortest length or fully extended to the maximum length, the correct digging angle is maintained. Main boom body is heavy welded structural steel box girder construction unit. Sliding into the main boom body is a reinforced box section extension to form an adjustable high strength boom.

THE PARSONS COMPANY Newton, Iowa
KOEHRING SUBSIDIARY
TRENCHING EQUIPMENT

Is delivery of bacteria-free water now a practical ideal?



PERFECTION in drinking water treatment is the delivery of a palatable, sterile water to the consumer all of the time. Practical considerations have limited the achievement of this goal.

Now, new facts about the significance of *free available chlorine residuals* have come to light. Acting on these facts it is practical to eliminate all gas forming bacteria from *any* water supplies.

Your Wallace & Tiernan Representative will be glad to supply details on the importance of Break-point Chlorination in assuring *free available chlorine residuals* together with the proper test procedures approved by public health authorities in your area.* In fulfilling your post-war responsibility for water that's safe beyond doubt, you'll want these facts.

* *Griffin, Chamberlain — A.P.H.A. Paper (Oct. 1944)*

WALLACE & TIERNAN COMPANY, INC.

Manufacturers of Chlorine and Ammonia Control Apparatus
Newark 1, New Jersey. Represented in Principal Cities

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CONN.. New Haven—W. I. Clark Company
DEL.... Phillips Machinery & Tractor Co., Baltimore
FLA.... Jacksonville, Miami, Tampa—Florida Equipment Co.
Pensacola—Ray-Brooks Truck & Tractor Company
GA.... Atlanta—Tri-State, Inc.
IDA.... Boise & Pocatello—Intermountain Equipment Co.
ILL.... Peoria & Springfield—A. E. Hudson Company
Salem—E. W. Werner Motor Company
Chicago—Great Lakes Supply Corp.
IND.... Indianapolis—Indiana Equipment Co., Inc.
IOWA... Des Moines—Herman M. Brown Company
KANS... Wichita—S. H. Denney Road Machinery Co.
KY..... Louisville—Brandeis Machinery & Supply Co.
LA..... Baton Rouge & Monroe—Dunham-Pugh Co.
MAINE.. Portland—Maine Truck-Tractor Co.
MD.... Baltimore—Phillips Machinery & Tractor Co.
MASS... Newton Highlands—Tractors, Inc.
MICH... Bark River—Bark River Culvert & Equipment Co.
Detroit and Grand Rapids—
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MINN... Minneapolis & Duluth—Thorman W. Rosholt Co.
MISS... Jackson—Mississippi Road Supply Co.
MO.... St. Louis—Missouri-Illinois Tractor & Equip. Co.
Kansas City—Noel V. Wood, Inc.
MONT.. Billings—Industrial Equipment Company
NEB.... Omaha—Nebraska Tractor & Equipment Company
NEV.... Reno—Allied Equipment, Inc.
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N.M.... Albuquerque—Hardin & Coggins
N. Y.... Buffalo—Dow & Company, Inc.
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Long Island—George Malvese & Co.
Albany, Syracuse—Milton-Hale Mach. Co.
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N. D.... Fargo—Myhra Equipment Company
OHIO... Cleveland—Gibson-Stewart Company
Cincinnati—Rish Equipment Co.
Cambridge—Major Equipment Co.
OKLA.. Tulsa & Guthrie—C. L. Boyd Company, Inc.
ORE.... Portland & Eugene—Howard-Cooper Corporation
PA..... Butler—National Equipment Co.
Pittsburgh—Atlas Equipment Corp.
Philadelphia—Service Supply Corp.
Harrisburg & Wilkes Barre—State Equipment Co.
R. I.... Providence—Tractors, Inc.
S. C.... Columbia—N. H. Summers Road Machinery Co.
S. D.... Sioux Falls, Rapid City—Empire Equipment Company
TENN... Knoxville & Chattanooga—
Brooks Equipment & Mfg. Co.
Nashville—Industrial Tractor & Equipment Co., Inc.
Memphis—Road Builders Equipment Co.
TEXAS.. Dallas & Houston—Browning-Ferris Machinery Co.
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VA..... Richmond—Municipal Sales Company
Richmond and Roanoke—Rish Equipment Co.
Alexandria—Phillips Mach. & Tractor Co.
WASH.. Spokane, Seattle, Walla Walla—Howard-Cooper Corp.
W. VA.. Charleston and Clarksburg—Rish Equipment Co.
WIS.... Eau Claire—Bark River Culvert & Equipment Co.

SEE **Adams**
AD ON OPPOSITE PAGE

Many roads and bridges in postwar project plans

Cleveland, Ohio—The city service department has completed plans for 187 postwar projects that will cost an estimated $8,025,035.

Five bridges are among these rehabilitation and reconstruction jobs on which the department is all set to go as soon as the material and man power are available.

In addition, the engineering division has partly completed plans for 350 projects costing $45,705,104.

Pennsylvania — The Pennsylvania Postwar Planning Commission has reported its endorsement of the State Highway Department's half-billion dollar five-year road building plan, announced approval of a report of Attorney General James H. Duff on an anti-stream pollution program and prepared to develop plans to encourage private housing developments.

The planners said they would not attempt to dictate what roads are to be improved, but their program will include construction of needed highways and bridges, elimination of grade crossings and widening of heavy traffic lanes. The road program will provide 2,000,000 man-days of employment a year.

Arkansas—Arkansas will share in distribution of $100,000,000 in federal road fund within 30 days, state Highway Director W. W. Mitchell said last week.

The preliminary fund will be utilized for surveys and plans, thereby permitting the state to be ready for construction when the President proclaims an end of the emergency or a concurrent resolution of Congress declares that the situation has eased enough to permit highway work.

Mr. Mitchell said he did not know how much money Arkansas will receive.

"But we will get our share," he said. "In the meantime, we are conducting our early surveys with funds already made available for that purpose."

Ohio—Highway Director Hal G. Sours of Ohio says that the highway department has ready plants for $27,000,000 worth of detailed postwar projects and plans for $25,000,000 more which are 25 to 75 percent completed.

Expenditure of $2,500,000 for schools has been decided on by the Halifax, N. S., school board. Nine new schools will be built, including a vocational training center to cost $500,000. With the completion of the scheduled work, the school facilities of Halifax will be doubled.

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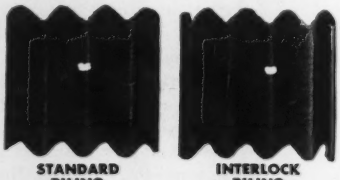
STEEL SHEET PILING
. . . is Easier To Get

Yes! Restrictions have been modified, priority ratings are lower, and you can again use the famous CORRUGATED Steel Sheet Piling, either standard or interlocking type, for the construction jobs you are figuring on.

CORRUGATED Steel Sheet Piling is strong, watertight, easy-to-handle, easy-to-transport and has unusually high salvage value . . . ALL IMPORTANT FEATURES.

Use it for bridges, dams, locks, sewage disposal plants, docks, levees, bulkheads, and any other big or little job where lightweight steel or wood piling is required. Send for specifications, catalog and priority facts today.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CAINE STEEL CO.
1820 North Central Ave., Chicago 39, Ill.

KEEP YOUR CONVEYOR BELTS GOING

FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco belt fasteners. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

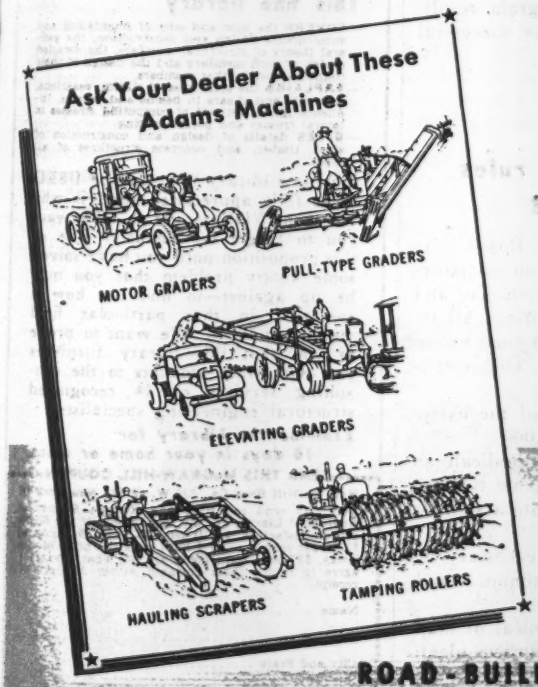
Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.

FLEXIBLE STEEL LACING CO.
4656 W. Lexington St., Chicago
Write for your copy.

FLEXCO H-D BELT FASTENERS
Sold by supply houses everywhere

FROM DITCH CUTS TO BANK CUTS

Without Mechanical Adjustments



MANY road grading jobs call for frequent alternating between ditch cuts and bank cuts—particularly where several bank cuts are necessary.... With Adams motor graders the operator can alternate between deep ditch cuts and high bank cuts, as pictured above, without shifting the blade on the circle or adjusting the length of blade lift links. Simply by using his operating levers, he goes from one position to the other in less than a minute—almost in the time it takes the outfit to turn around.

This is but one time-saving reason why your next motor grader should be an Adams. See your local Adams dealer now about the availability of new machines.

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INDIANAPOLIS, INDIANA

ADAMS

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools.
See full page ad page 161

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Get more WORTH from air with WORTHINGTON

Buy War Bonds

Worthington Pump and Machinery Corp

Jacksonville engineers receive high awards

After 50 years service. Lieut. Col. George E. Brown, Corps of Engineers was presented with the War Department's award for exceptional civilian service. The award was presented by Col. A. B. Jones, Jacksonville, Fla., District Engineer. It bears the signatures of Maj. Gen. Eugene Reybold, Chief of Engineers, and Lieut. Gen. Brehon B. Somervell, Commanding General, Army Service Forces.

The citation reads, in part, as follows:

"Specific mention from a long list of meritorious achievements is made of your outstanding service to the department, to the Corps of Engineers, and to the public in the protective measures taken to prevent loss of life and property in the Miami hurricane of Sept. 18, 1926, and in the clearance of Miami Harbor after that storm. In addition, recognition is accorded your very real services in the development of river and harbor and fortifications works; and your outstanding services in directing construction of important air forces and ground forces installations during the present war emergency."

A similar award was also made to Lieut. (j.g.) H. V. Kramer, USNR, for "exemplary performance of duty and initiative in the successful improvement of design features of flexible gunnery ranges constructed by the Jacksonville District, Corps of Engineers, and used in the flexible gunnery program, resulting in material aid to the successful prosecution of the war."

• • •

Utility extension rules modified by WPB

The War Production Board has amended its restrictions on construction of extensions by water, gas and central steam heating utilities. All restrictions on the length of such extensions have been removed. The restrictions which remain are:

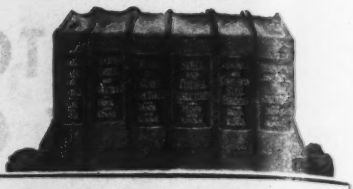
The net material cost of the extension must not exceed $10,000.

The extension must not duplicate an adequate service of the same type already installed or constitute a standby service.

The extension must be necessary for rendering service at minimum standards.

Design must be economical of manpower and material and utilize plentiful rather than scarce material.

In the case of gas service the restrictions of Orders U-7 and L-174 are still applicable.



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FOR YEARS the Hool and Kinne Library has been providing structural engineers with the facts they need *on every problem concerned with the design and construction of civil engineering structures.*

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TWO WAYS TO INSURE A POST WAR FUTURE

HERE'S ONE WAY:—*The Institute of Life Insurance reports leading insurance companies laying plans for another 100 million dollars of housing within 6 months after the war.*

HERE'S THE SECOND:—*U. S. building contractors planning now their purchases of trouble-free Blue Brutes to back their post-war bids.*

That 160′ compressor shown above—just one of many types and models—you'll see displayed in post-war Blue Brute showrooms.

Outside—*looks* fit and strong—but look *inside*. Clean-muscled design, with Feather* Valves (above all imitations, lightest, tightest, quietest), saves hours and dollars downtime. Engine—smooth-running six—start it and hear it hum! And note—both engine and compressor "cradled" by special unit coupling in 3-point suspension, safe from vibration, shock, distortion.

For earth work, gas lines, light lines, drains, you'll want that Blue Brute Backfill Tamper too (the W-8)—to save hand-tamping time; rugged but easy-handling, made of special steel.

In brief, with these Blue Brutes, you've got an air-power team that saves construction costs. Your nearest Blue Brute distributor is listed on page 160.

*Reg. U. S. Pat. Off.

PC 4-19

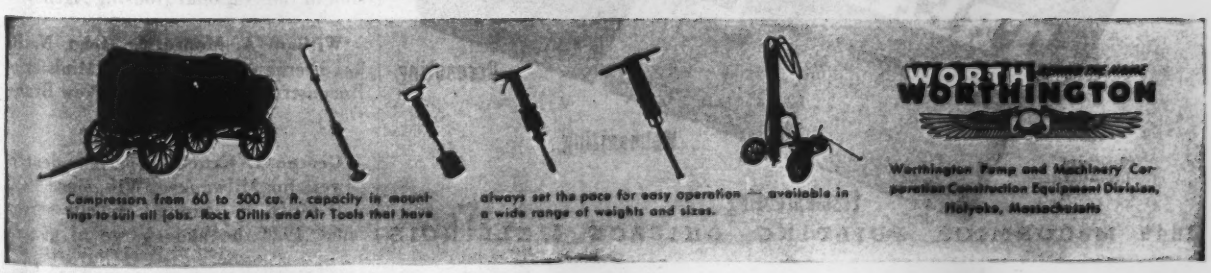
Behind the Fighting Fronts with

BLUE BRUTES

On a midwest construction job, contractor reports: "Five Blue Brute compressors in service 6 months, untouched except for oil change"—and the same top-notch performance makes Blue Brutes pay, on fighting supply lines here and overseas, camps, Navy yards, air bases, ordnance plants. Will save *you* time and cash post-war.

Get more WORTH *from air with* WORTHINGTON

BUY BLUE BRUTES


Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.
WORTH
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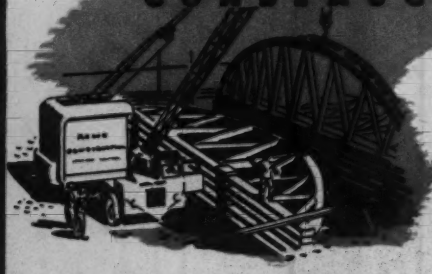
Worthington Pump and Machinery Corporation Construction Equipment Division, Holyoke, Massachusetts

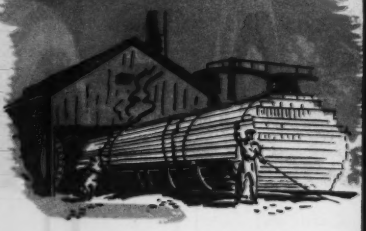
Wood SERVES IN WAR CONSTRUCTION



Wood goes up fast... *wood helped speed the war effort.* Wood will do the same for you when you shift to peacetime construction.

Treated Wood COMBATS DECAY AND TERMITE ATTACK

Wolman Salts* preservative has been proved in service. The performance of hundreds of millions of feet of lumber treated with it testifies to the worth of Wolmanized Lumber*



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MEN AND JOBS

(*Continued from page 90*)

At the request of the British government, **Jacob Crane** of Highland Park, Ill., urban development director of the National Housing Agency, will go to England as a consultant on housing and city planning. A graduate in civil engineering from the University of Michigan, he was formerly assistant coordinator of defense housing, and has been a consultant on housing and similar problems for more than 60 local governments, four states, the National Resources Planning Board, the Resettlement Administration and the governments of Russia, China and Colombia. He recently returned from Panama and the Canal Zone.

Christophe Chagnon has recently been appointed chief engineer of the Quebec Streams Commission. He was graduated from the Ecole Polytechnique of Montreal in 1926, when he joined the engineering staff of the commission and has been with it ever since.

Recently **A. L. Thomas** was promoted to lieutenant colonel and made commanding officer of his regiment of U. S. Army Engineers in Iran. Before entering the Army in 1942, he served as assistant highway engineer in the bureau of design, bridge department, of the Illinois division of highways. Of the eight Springfield engineers who sailed March, 1943, for work in the Persian Gulf Corridor, only he and **Capt. Joel Eastham** remain in Iran. Captain Eastham, formerly with the C. I. & M. Railroad, is now a battalion commander.

G. B. Robeson, for the past several years associated with a Hickory, N. C., construction firm, has been appointed superintendent of public works at Hickory to succeed **H. K. Setzer,** who resigned recently to enter the private field.

Rudolph J. Nedved has been chosen executive director for the Housing Authority of Milwaukee, Wis. Mr. Nedved is at present chief of the site and dwelling standards section in the Technical Division of the National Housing Agency.

William A. Moore, St. John, N. B., has been appointed Deputy Minister of Reconstruction, Province of New Brunswick.

George J. Kruell, superintendent of sewers for Milwaukee, Wis., since 1932, will retire on March 1. In city service since 1926, he had charge of general

JENKINS AIR FURNACE MALLEABLE IRON VALVES

survive many times the punishment of the most destructive service conditions!

Hundreds of users have learned that they can count on these Jenkins Valves to perform perfectly under the conditions for which they are recommended . . . But just how much *extra* punishment can they stand? To find out, a "torture chamber" was set up in the Jenkins plant.

IN A FURNACE valve bodies were heated, in preparation for shock tests, to temperatures as high as 1500°F.

TED BY WATER SHOCK When thoroughly heated, valve dies were removed from furnace and immediately drenched th a 2½ inch stream of cold water under 80 lbs. pressure r one half minute. No damage or cracks resulted.

TED BY IMPACT SHOCK! Also, the flanges were struck 8 ows (about 75 foot pounds) with a twelve pound ham- r. In spite of this punishment, no cracks developed, a markable display of toughness.

STOCK MALLEABLE IRON VALVE BODIES were subjected to extremes of temperature and impact shocks. Yet every valve withstood these tests without the slightest damage . . . displayed the kind of stamina you would ordinarily expect only from carbon steel valves!

Such endurance may well be just what you need for the tough valve spots in your plant. And since they are priced considerably lower than steel, Jenkins Air Furnace Malleable Iron Valves may save you money in more ways than one. Use them for *steam pressures up to 150 lbs., and temperatures up to 450°F.*, whenever shocks and vibration are abnormal, or corrosive conditions severe.

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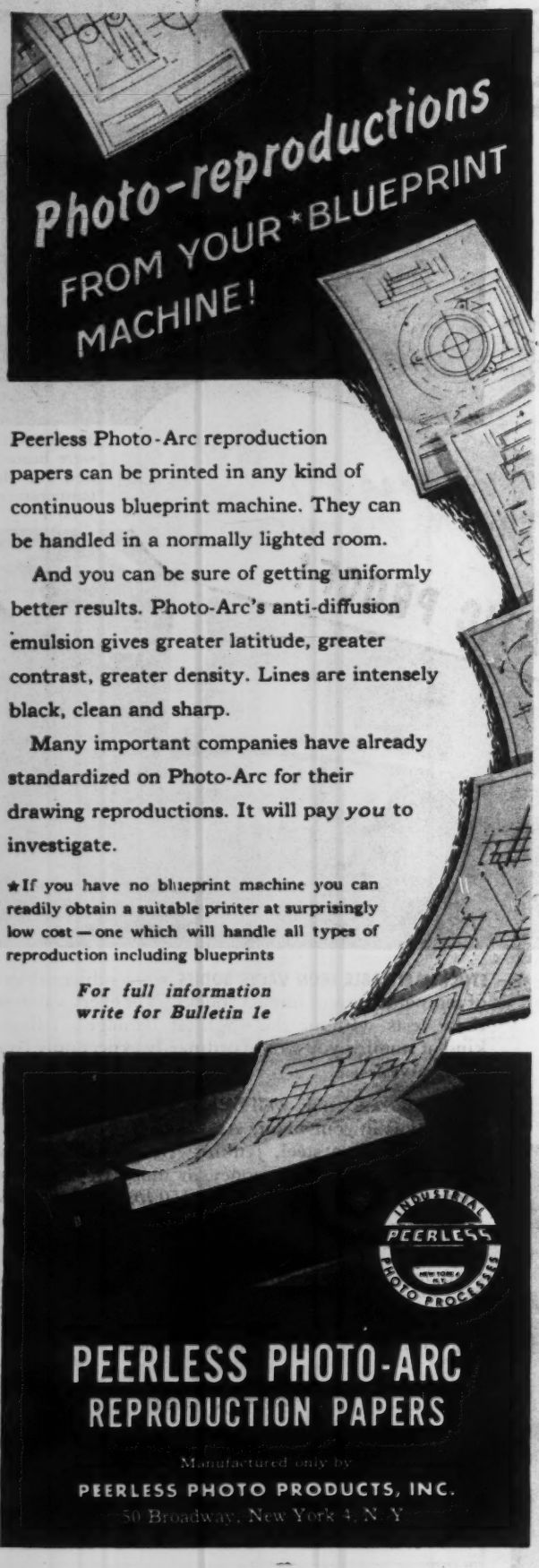
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engineering design, was deputy commissioner of public works, supervising engineer in the department of public works, and a member of the city harbor commission for four and a half years.

Maj. Joseph W. Hanna, Raleigh, N. C., formerly an engineer for the U. S. Department of Agriculture in North and South Carolina, and now serving in the Central Pacific, recently was awarded the Bronze Star for meritorious service on Guam.

Frank L. Raschig, Cincinnati, has been renamed director of public works by Gov. John W. Bricker of Ohio, for a term to end Jan. 1, 1946. He was first named to the post in January, 1940, and has served continuously since.

Jack Lewis, sanitary engineer and chief of the city health inspection division at Houston, Tex., has joined the Texas State Health Department to serve as chief sanitarian of a county health unit to be assigned to him.

John Bratton, Jr., Raleigh, N. C., is a second lieutenant in the U. S. Marine Corps and has been assigned to the Engineer School at Camp Lejeune, N. C. He is a graduate of the Duke University School of Engineering.

John D. Carney has resigned as secretary of the Youngstown, Ohio, municipal postwar planning bureau to join the General Motors Corp. in Warren, Ohio.

Herbert R. Pirkner has recently left The Port of New York Authority to join Palmer & Baker, Inc. as engineer of design for the proposed Bolivar Tunnel at Galveston, Tex.

J. A. Spears has been named district engineer for the sixth district of the Kentucky State Highway Department at Ashland, to succeed **N. O. Neisser**, who has been transferred to a new post.

Andrew Hunter, works superintendent has been named acting city engineer of New Westminster, B. C., replacing **R. E. Potter** chief engineer, now an engineer officer in the R.C.A.F.

Lee Page, Grundy Center, Ia., has left the Grundy County engineer's office after 16 years service to take a position with Beu & Sons, road contractors at Sumner, Ia.

Col. Edwin C. Kelton, commanding officer of the Pacific Division, U. S. Army Engineers, recently presented five San Francisco men and one woman with Army Service Forces awards in recognition of their long years of government service as civilian engineers. They were Henry Patrick O'Hagen, 41 years serv-

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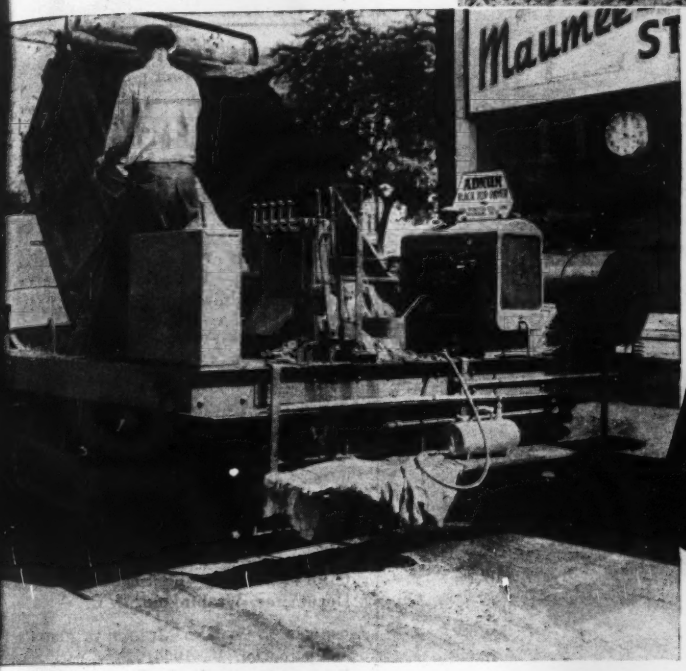

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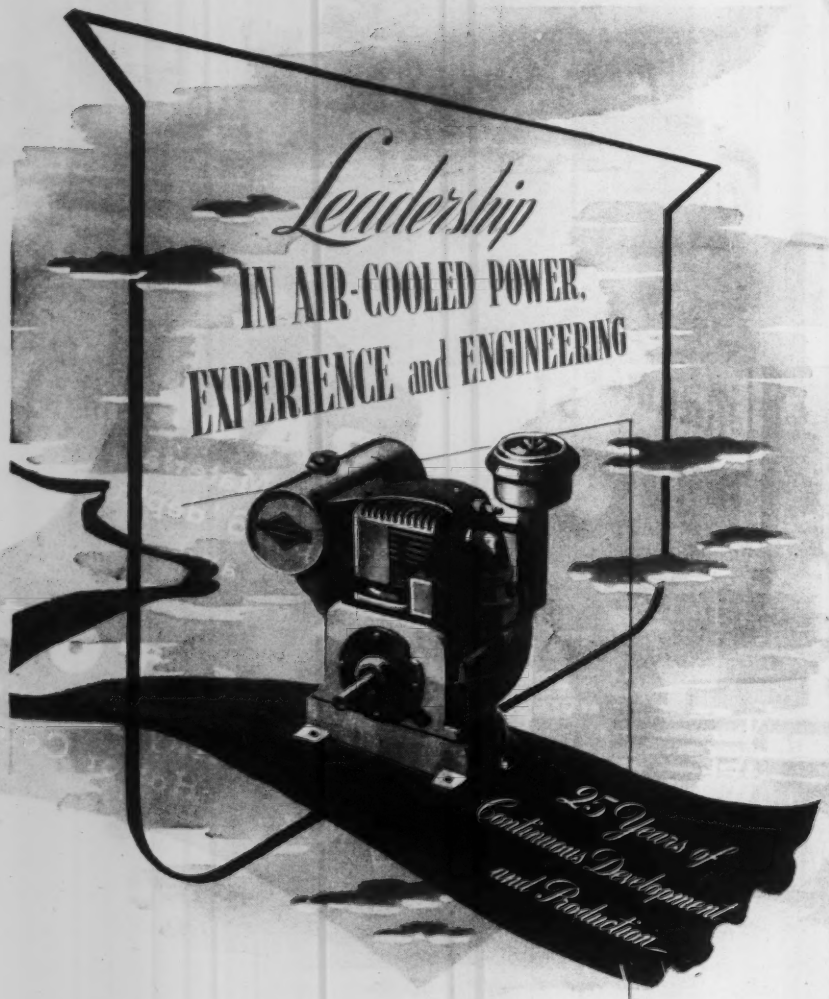

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ice; Owen G. Stanley, 38 years; Harry Baxter, 34 years; William J. Sharp, 27 years; Frederick C. Scheffauer, 37 years and Corinne M. Ryan, 27 years.

Milton H. Fies, connected with the DeBardeleben Coal Corp. for the past thirty-two years, is retiring as vice president in charge of mining operations, to open an office in the First National Bank Building, Birmingham, Ala., as consulting engineer. He will have associated with him specialized engineers in civil, mechanical, chemical and industrial engineering.

Reports and Pamphlets

(*Continued from page* 144)

RECOMMENDED PRACTICE FOR THE DESIGN OF CONCRETE MIXES—American Concrete Institute Mix Design Standards (ACI 613-44). New Center Bldg., Detroit 2, Mich.

PROCEEDINGS OF THE THIRTIETH ANNUAL ROAD SCHOOL—Engineering Bulletin No. 56, Purdue Univerrsity, Lafayette, Ind.

POSTWAR PLANNING IN THE UNITED STATES—No. 3. The Twentieth Century Fund, 330 W. 42nd St., New York 18, N. Y. $1.

THE INFLUENCE OF MODERN GLUES ON THE UTILIZATION OF WOOD—Address by W. F. Leicester at the Wood Products Conference. Casein Company of America, 350 Madison Ave., New York 17, N. Y.

THE FOREMAN'S GUIDE TO LABOR RELATIONS—U. S. Dept. of Labor Bulletin No. 66. For sale by the Superintendent of Documents, Washington, D. C.

APPROVED STATE AND MUNICIPAL PROJECTS—Up to Oct. 15, 1944. New York State Postwar Public Works Planning Commission, Albany, N. Y.

BED-LOAD TRANSPORTATION IN MOUNTAIN CREEK—By Hans Albert. Einstein. U. S. Dept. of Agriculturre, Soil Conservation Service, Washington 25, D. C.

FACTUAL REVIEW OF HIGHWAY FINANCE IN THE UNITED STATES—Reprinted from the A.P.I. Quarterly of the American Petroleum Institute, New York 20.

BALTIMORE ARTERIAL REPORT—A report by Robert Moses, W. Earle Andrews, Madigan-Hyland, and Parsons, Brencherhoff, Hogan & McDonald to the Mayor and City Council of Baltimore.

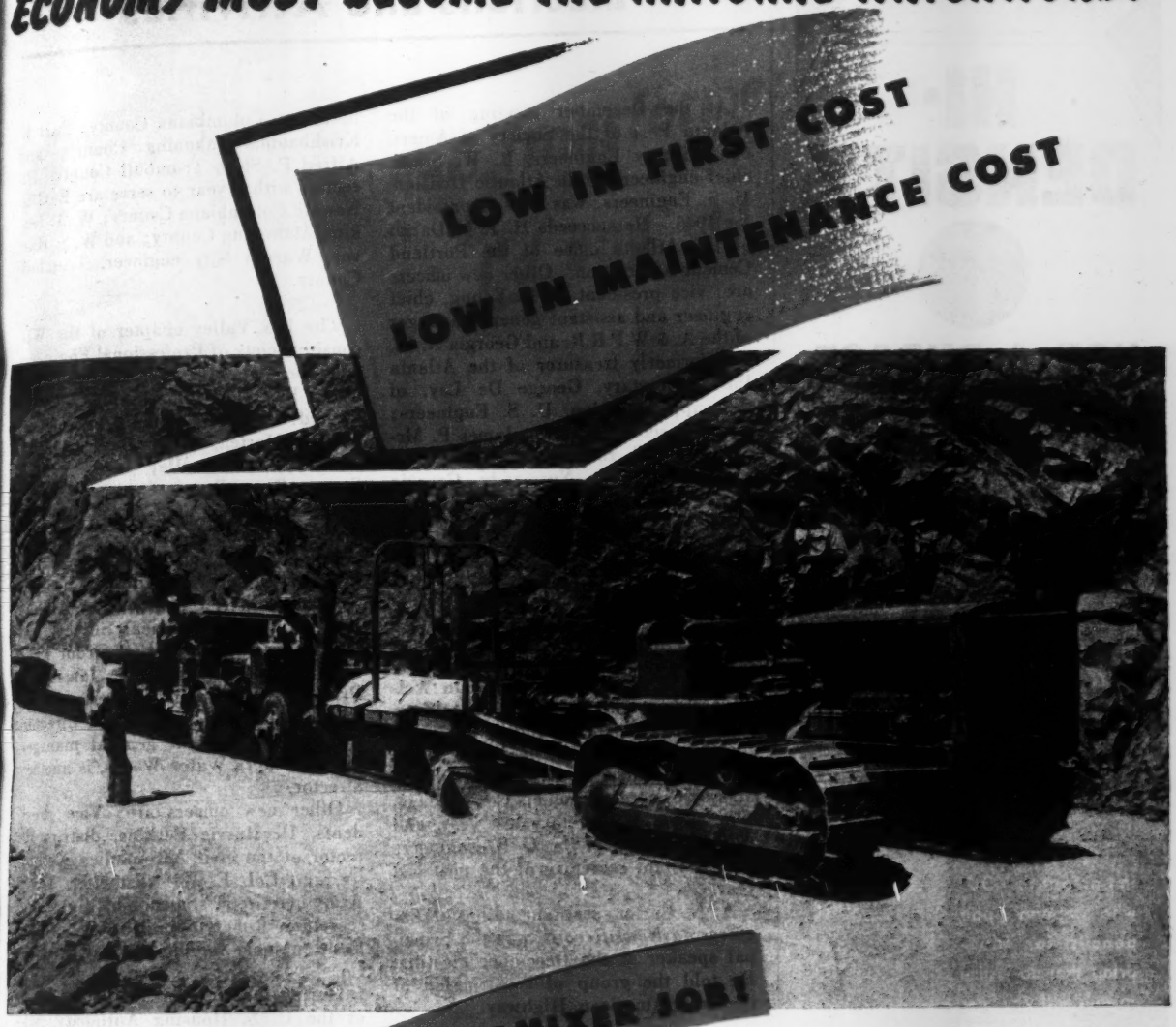
KANSAS ENGINEERING SOCIETY YEAR BOOK, 1944—36th Annual Convention.

ANNUAL REPORT OF THE STATE BOARD OF ENGINEERING EXAMINERS for the year ending December 31, 1943, Des Moines, Iowa.

SIXTH ANNUAL REPORT OF THE KENTUCKY STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS for the year ending June 30, 1944.

SUMMIT COUNTY AND AKRON, Ohio—Report on Water Supply, Nov. 1, 1944.

ECONOMY MUST BECOME THE NATIONAL WATCHWORD!



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Elections and Activities

At the December meeting of the Atlanta Post of the Society of American Military Engineers, R. W. Stuck, chief engineer, South Atlantic Division, U. S. Engineers, was chosen president for 1945. He succeeds H. J. McDargh of the Atlanta office of the Portland Cement Association. Other new officers are: vice president, S. R. Young, chief engineer and assistant general manager of the A. & W.P.R.R. and Georgia R. R., and formerly treasurer of the Atlanta Post; Secretary, George De Lay, of the supply division, U. S. Engineers; assistant secretary, Capt. James P. McGowan, U. S. Engineers, Atlanta; and treasurer, George Normandy, Georgia Power Co., Atlanta.

Directors for the coming year are: Burton J. Bell, U. S. Engineers, who is also a national director; Lt. Col. A. V. Shelton, Chief of military engineering, Atlanta office of U. S. Engineers; Maj. George R. McCaulley, executive officer of the Atlanta division office; U. S. Engineers; Mr. McDargh, and John Wetzel, architect with Robert & Co., Atlanta.

Retiring officers, in addition to those previously mentioned, include: James A. Higgs, Jr., southern manager for the Massey Concrete Products Co., Chicago, who served as secretary last year, and A. J. Southern, of the U. S. Engineers and assistant secretary of the post last year.

A. N. Carter, assistant editor of *Engineering News-Record*, was the principal speaker at the December meeting. He told the group of construction of the Inter-American Highway.

C. P. Lauderbaugh, Columbus, Ohio, former secretary to State Highway Director Robert S. Beightler, and commissioner of Franklin County since 1940, has been elected president for 1945 of the County Commissioners Association of Ohio. Others elected were: R. L. Landman, Miami County, first vice-president; Dick Deatrick, Paulding County, second vice-president; F. E. Treon, Montgomery County, secretary; and H. T. Morris, Allen County, treasurer.

Fred Hubbard has been re-elected president of the Mahoning Valley Chapter of the Society of Professional Engineers at Youngstown, Ohio. Others elected were: Joseph J. Wass, Warren, vice-president; Albert Coope, Mahoning County Sanitary Engineer, Youngstown, secretary; and Clyde Wenrich, treasurer. Directors for two-years are: George D. Gonzales, state highway department, Columbiana County; Earl F. Krishbaum, Mahoning County; and Alfred P. Stoll, Trumbull County. Directors with a year to serve are Earl C. Newall, Columbiana County; W. A. Jenkins, Mahoning County; and W. S. Harvey, Warren City engineer, Trumbull County.

The Fox Valley chapter of the Wisconsin Society of Professional Engineers has been organized at a meeting in Green Bay. The following officers were elected: Robert M. Connelly, Appleton; George Morten, Green Bay; Clarence Zachow, Clintonville; and Francis Stenno, Green Bay.

At the December dinner meeting of the Georgia Section, American Society of Civil Engineers, Medford Theodore Thomson, district engineer at Atlanta for the U. S. Geological Survey, was elected president of the group for 1945. Mr. Thomson succeeds James C. Prather, operating superintendent, Rich's Inc., who was named director. Paul Weir, assistant general manager of the Atlanta Water Works, is another director.

Other new officers are: Vice presidents, H. Harvie Perkins, district director of the civil Aeronautics Authority, and Col. F. W. Allstaetter, U. S. Army (retired) Savannah, Ga.; and secretary, Robert Olin Harris, development engineer for the Tri-State Culvert Co.

During the meeting Marion R. Kays of the U. S. Housing Authority, was presented with a certificate of life membership.

Carolina Road Builders Association, Inc., has elected these officers: Nello L. Teer, Jr., Durham, N. C. re-elected president; E. H. Hines, Greenwood, S. C., re-elected vice-president. Governors re-elected were: F. D. Cline, Raleigh, N. C., John R. Suber, Whitmire, S. C., W. E. Graham, Cleveland, N. C. T. R. McMeekin, Cheraw, S. C., and the new governors elected are: Harry Wilson, Raleigh, N. C., and Charles Yager, Columbia, S. C.

Robert H. King of Danville, has been re-elected president of the Indiana Highway Constructors, Inc. John G. Dehner of Fort Wayne, was re-named vice-president.

Gibbs A. Dyer has been elected president of the North Texas section of the Texas Society of Professional Engineers.

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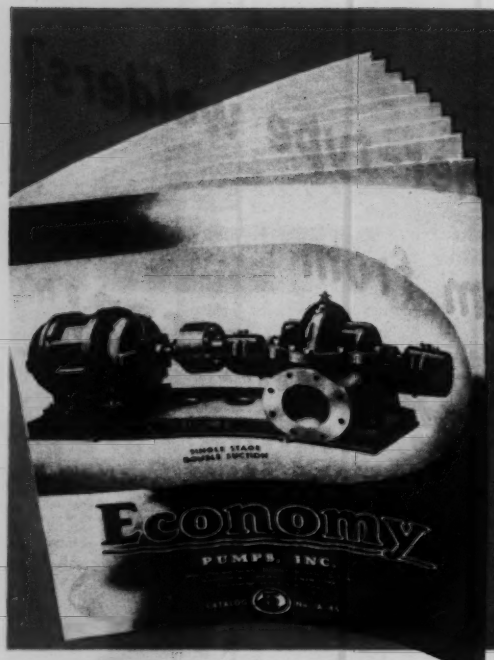

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Dyer succeeds Oscar Koch. Other officers elected were W. J. Powell, vice-president; C. W. Woolridge, secretary-treasurer, and W. M. Moeller, T. E. Huffman, Edward J. Bowles, Paul G. Bentley and Roy A. Taylor directors.

The North Carolina Section of the American Society of Civil Engineers has approved the recommendations of its employment committee calling for the appointment of a permanent committee to study federal legislation affecting employment conditions. Members of the committee are Theodore S. Johnson of Raleigh, chairman; N. S. Hayes of Greensboro, and W. M. Platt of Durham. H. W. Kueffner of Durham, section president, is to name the permanent committee soon.

The Connecticut Rural Roads Improvement Association has elected the following officers: President, Louis G. Tolles of Southington; vice-president, Robert C. Mitchell of Southbury; treasurer, A. Ward Spaulding of Suffield; secretary, Dr. William L. Higgins of Coventry.

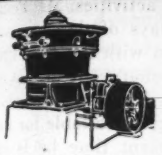
Ralph A. Smallman, Birmingham, has been elected president of the Alabama Branch, Associated General Contractors. Other officials for the new year are: D. M. Praytor, president Kershaw Contracting Co., Birmingham, first vice-president; Bob Dethlefs, president, Dethlefs-Boozer Co., Anniston, second vice-president; W. E. Morris, Birmingham, treasurer, and J. B. Rawls, Birmingham, secretary. W. J. R. Dunn, president, Dunn Construction Co., Birmingham, J. B. Owens, president, Owens Construction Co., Birmingham were elected new members of the board. Holdovers were, J. E. Dillard of Bessemer; J. B. Perusini of Birmingham; Quinn Flowers of Dothan, and W. J. Perry of Winfield.

Henry Bush, St. Louis, Mo., has been elected state chairman of the Citizens Postwar Construction Council.

Bruce Williams, of Joplin, has been re-elected president of the Missouri Society of Professional Engineers. Also re-elected were: E. R. Schultz, Cape Girardeau; C. G. Roush, Kansas City, Mo., and T. J. Skinner, St. Louis, as vice-presidents and H. J. Bruegging, Jefferson City, Mo., secretary-treasurer.

Joseph W. Davin has been re-elected president of the Home Builders Association of Jacksonville, Fla., and was named to the board of directors of the National Association of Home Builders of the United States. C. Finley Knight was chosen as vice-president, succeeding Walter Crabtree.

Where will YOUR plant fit in the postwar picture?



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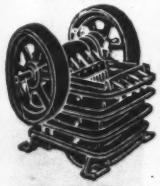
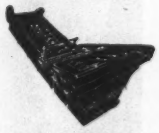


JAW CRUSHERS



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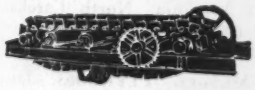

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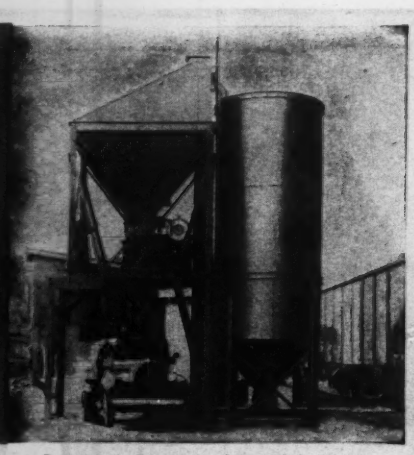

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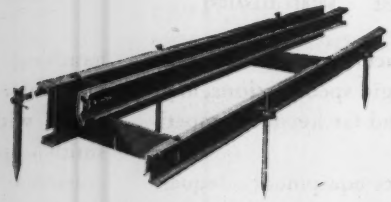
The new Heltzel Military Highway Form

A typical Heltzel Truck Mixer Charger—600 ton Batching Bin—1200 bbl. Bulk Cement Reserve



Steel Curb and Gutter Forms for any cross section on specification

Portable aggregate Batching Bins made by Heltzel in capacities ranging from 30 to 200 tons.

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.

Manufacturers' Activities

HAMILTON O. PENN of New York has been elected a director of the Tyson Bearing Corp.

Mr. Penn heads the H. O. Penn Machinery Co. of New York, one of the largest distributors of construction machinery in the United States. He brings much experience to the Tyson directorate in one of the principal fields for which bearings are suited—construction equipment.

Among his many activities, Mr. Penn, during the early days of the war, was a dollar-a-year man with the War Production Board, in charge of the inventorying of all used construction machinery and making it available for war work. At the present time he is executive vice president of the Associated Equipment Distributors of America.

GAR WOOD Industries, Inc., announces the promotion of Amos E. Heath, formerly manager of the company's Washington branch, to the new position of general district manager of the Washington and Central Seaboard district. Mr. Heath has been with the company for the last 22 years, five as a salesman and seventeen as manager. In his new position, Mr. Heath will serve as Gar Wood Industries' liaison with the armed forces and all government departments. He will also supervise all distributors, dealers and branches in Maryland, Virginia, West Virginia, North Carolina and South Carolina.

U. S. MENGEL PLYWOODS, INC., formed and jointly owned by the Mengel Co., and United States Plywood Corp. to operate a chain of plywood distributing warehouses, announces the opening of a new warehouse at Jacksonville, Fla. This is the second warehouse in the chain which will be extended to other cities, according to L. B. Olmsted, vice-president and general manager of

TAMPTITE

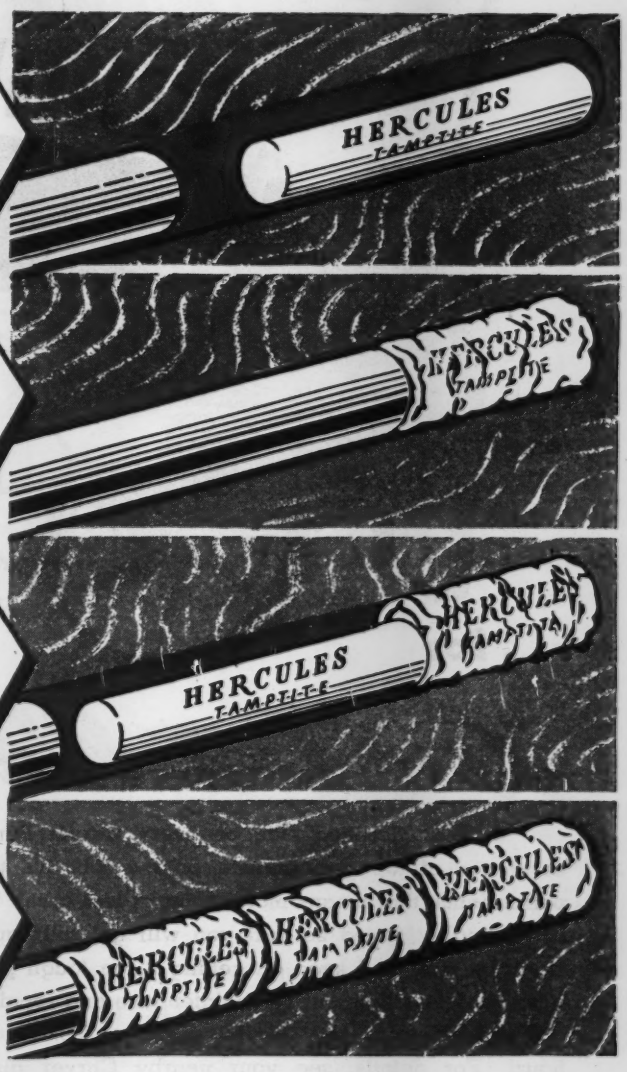
SAVES TIME · SAVES LABOR · PACKS SNUGLY · GIVES BETTER BREAKAGE

1 With Tamptite, you load your favorite Hercules explosive into the bore hole in the usual manner. There's no need to split the cartridge. That saves time and eliminates loose, spilled powder.

2 Next, the tamping rod compresses the dynamite in the hole, packs the charge tightly. There is practically no air space remaining around the charge.

3 Insert another Tamptite cartridge. Then, simply tamp the same as the first cartridge. Continue inserting and tamping cartridges for whatever loading you wish.

4 Your charge is concentrated snugly for maximum blasting effectiveness. The result is better breakage of ore or rock, speedier mucking, and a faster mining cycle.



Order your favorite Hercules explosives in Tamptite cartridges. All the customary grades and sizes of Hercules Gelamites*, Hercomites*, Extra Gelatins, Gelatins, and Extra Dynamites are available in this time-saving wrapper.

HERCULES

EXPLOSIVES

REG. U. S. PAT. OFF. XH-45

HERCULES POWDER COMPANY INCORPORATED .... 940 KING STREET · WILMINGTON 99, DELAWARE

ORDER HERCULES EXPLOSIVES IN TAMPTITE CARTRIDGES

. . . for

Low Cost Water

● The "Certified" tag on every Carver Pump is your assurance of top performance on the job. It's the kind of performance that means more water at less cost. Each pump is thoroughly tested so that you will get full capacity right from the start and keep on getting it, on tough jobs or easy ones, with less time out for maintenance and repairs.

Available from 1½" to 10", 5,000 to 200,000 gallons per hour. For details, see your nearby Carver distributor or write direct.

THE CARVER PUMP CO. Muscatine, Iowa

the jointly-owned enterprise. The first warehouse in the chain was opened last January at Louisville, Ky.

ELECTION of Arch A. Warner as president and general manager of Rockford Drilling Machine division of Borg-Warner Corp. at Rockford, Ill., has been announced.

Warner, former works manager of Mechanics Universal Joint Division of the corporation, also at Rockford, succeeds E. C. Traner, who at his own request has retired from active management of the company to become chairman of its advisory board. Before going to Rockford in 1941, Warner was sales engineer at Detroit for Mechanics, which he joined in 1938.

Prior to his connection with Borg-Warner Corp., Mr. Warner was with Universal Products for 10 years and for almost as long was in engineering and sales development work on carburetors for both Zenith and Stromberg.

Mr. Traner, born at Rockford in 1876, is one of the veteran manufacturers of the Borg-Warner organization.

W. F. KURFESS has been appointed manager of the Milwaukee plant of Joseph T. Ryerson & Son, Inc., succeeding the late George W. Smith.

Mr. Kurfess has been on active duty with the Navy in the Bureau of Ships, and in the Office of Procurement and Materials since Sept., 1941, with the rank of commander. Prior to his war service, he was a Ryerson executive in Chicago and has had many years experience in solving the engineering, metallurgical and supply problems of the metal-working industries.

Universal Atlas Cement Co., United States Steel Corp. subsidiary, announces the appointment of Edward J. Head, assistant sales manager, as sales manager in New York, and the appointment of Foster A. Hagan as assistant sales manager there.

Early in the program of defense construction Mr. Head went to Washington to coordinate the Universal Atlas sales activity there, leaving in 1941 to

Its Greater Endurance Means Better Value . . . Preformed "HERCULES" (Red-Strand) Wire Rope is designed and manufactured to do today's more difficult jobs quicker . . . better . . . safer . . . more economically. Proper selected materials, plus advanced manufacturing methods, plus the specific advantages of the preforming process are the factors which add up to its better value.

What are some of the specific advantages of the preforming process? Actual service records show the following:

1

As broken wires lie practically flat, they are not so apt to injure the hands of men handling it. Also, there is less possibility of an "out of place" wire causing damage to adjacent wires in the rope.

2

It is not so easily kinked.

3

Its inert qualities make for smoother spooling and easier handling.

4

The preforming process minimizes the tendency of Lang Lay wire rope to loop and squirm.

5

There is less turning and twisting of the rope in the grooves, and less internal movement of the wires and strands—all of which tends to reduce both external and internal wear, thereby insuring longer service.

For consistent top-flight wire rope performance you can rely on "HERCULES". Let the Red-Strand be your guide. It is available in both Round Strand and Flattened Strand constructions in either the Preformed or Non-Preformed type. We shall be glad to help you select the right construction for your particular conditions.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street

SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

Ever watch a big-time slugger step toward the batter's box, swinging three or four bats as he goes? And then, discarding all but one of them, take a healthy cut and put one out of the park?

This simple illustration explains one of the reasons why Fuller Transmissions of Tomorrow will be better than ever. Fuller has long been a leading maker of transmissions for grueling "off-highway" jobs, where the going is really tough. Much of our war production has been for the same intensive kind of work. The transmissions that can—and did—do that sort of thing can handle over-the-highway operations as lightly as the ball player swings that single bat with such telling effect.

You'll be making no mistake when you look to Fuller for your transmission requirements—or insist on Fullers in the trucks and busses you buy. They've *done* the stiffest jobs there are.

FULLER MANUFACTURING COMPANY, KALAMAZOO, MICHIGAN
Transmission Division
Unit Drop Forge Division, Milwaukee, Wisconsin

ERIE THE COMPLETE LINE **BUCKETS**

Hundreds of Erie Buckets are being shipped monthly for war uses. Straight line bucket production experience means better buckets for post-war and fast delivery. Investigate the complete Erie line now.

ERIE STEEL CONSTRUCTION CO · ERIE, PA.
AggreMeters · Buckets · Concrete Plants · Traveling Cranes

go to British Guiana as coordinator and assistant project manager for The Elmhurst Contracting Co. in the construction of the base at Georgetown.

Mr. Hagan, from 1918 to 1924 was in the stevedoring and warehouse business. In 1924 he became a salesman for the Lehigh Portland Cement Co., joining Universal Atlas in 1942. He has since been special representative in New York.

GEORGE S. WHYTE, 77, founder and board chairman of Macwhyte Co., Kenosha, Wis., civic leader and philanthropist, died Dec. 16 last. He was born in Scotland, the son of a coal miner. He was the eldest of eight children and the whole family came to this country in 1884.

There were different jobs in those early days, including many weary days of walking the streets in search of work. He learned shorthand at an evening school and got a job as a stenographer and bookkeeper. He found an opportunity to join the sales force of the Washburn and Moen Co., makers of wire rope—and found his future!

This tribute was paid to Mr. Whyte by executives of Kenosha manufacturing industries:

"In his belief in the fundamentals of honesty between man and man, he was steadfast and immovable. His relations, as president of Macwhyte Co., with the employes of that company stand as a goal to be sought by employers and management elsewhere.

"He was loved by those who knew him best, became by his every thought, act and deed he earned the respect of his fellowman. He was direct and forceful in expressing his opinions, but never was he influenced by passion or prejudice.

"The City of Kenosha, the State of Wisconsin and the United States of America have lost a man whose stature measured great."

OSCAR C. GRUENDER, former general manager of the crusher division at Nordberg Mfg. Co., Milwaukee, Wis., has been appointed consulting engineer of the crusher and screen department and will have charge of design, research and development work. He joined Nordberg in 1928 when that firm acquired the crusher division of the Chalmers Williams Co., Chicago Heights, Ill.

What to do about Rust?

Make this Test

Immerse any rusty nail in a small quantity of Cities Service Rust Remover. If badly rusted, allow to remain for several minutes. You can actually see the rust dissolve.

See the Results

Remove nail and wipe dry with cloth or tissue. Note the complete absence of rust and the way the original surface reappears.

CITIES SERVICE RUST REMOVER has been tested for four years throughout a small, highly industrialized area in the East, where it has earned a unique reputation for performance. RUST REMOVER is a clean, clear liquid, practically odorless, non-inflammable, easily applied, and harmless to handle by those not allergic to specific chemicals. It is fast-acting, and, although heating somewhat accelerates results, general application is recommended at normal temperature (60°-90°F.). RUST REMOVER is effective on chromium, copper, aluminum, steel and iron.

5 Big Advantages

1. Non-Inflammable
2. Harmless to Normal Skin
3. Makes Metals Chemically Clean
4. Removes Rust by Chemical Action
5. Free from Muriatic, Sulphuric, Nitric and Oxalic Acids or Cyanide.

CITIES SERVICE OIL COMPANY
NEW YORK · CHICAGO

ARKANSAS FUEL OIL COMPANY

See a Free Demonstration of Rust Remover on Your Own Equipment.

(Available only in Cities Service marketing territory EAST of the Rockies.)

MAIL THIS COUPON TODAY!

CITIES SERVICE OIL COMPANY
Room No. 178
Sixty Wall Tower, New York 5, New York

Gentlemen: I'd like to test RUST REMOVER on my own equipment FREE OF CHARGE. Send me details.

Name.....

Company.....

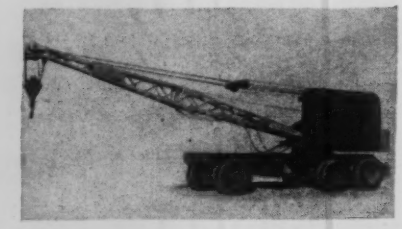
Address.....

City..... State.....

New Aids to the Constructor

Self-Propelled Crane

Power to propel the new self-propelled Lorain 20-ton crane is drawn from the revolving turntable engine and transferred to the carrier through an auxiliary travel shaft and center pin. Gasoline or diesel engines are available. Four travel speeds, ranging



from 1 to 7 mph., are available on forward or reverse. The unit in low gear can climb a maximum grade of 20 percent, according to the manufacturer's statement. Mounted on six wheels, the crane is one-man operated.

The crane's front axle has a special wide track for mounting and wheels of differential style for easy steering and elimination of tire scuffing. All controls for crane and clamshell operations are located on the turntable within easy reach of the operator. The all-welded boom is of pin-connected type, to permit quick insertion of center sections for a longer boom; straight or gooseneck tip extensions are available—*The Thew Shovel Co., Lorain, Ohio.*

• • •

Bituminous Admixture

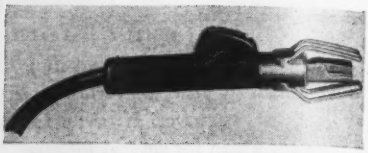
Many advantages are claimed for Nostrip, an oil readily miscible with any bituminous material, which does not affect any bitumen properties beyond the tolerance allowed in all standard bituminous specifications. With this product, no heating or drying of the aggregate is necessary, as it will adhere whether the aggregate is wet or dry. It is said to cut blading and mixing time in half, and to make lime or other addition to the aggregate unnecessary.

Nostrip is also valuable in cold patch work, it is claimed, as it works well with sand mixes for skin patches when a paddle type of mixer is used, or when straight stone, gravel or slag mixes are made in a concrete mixer.—*Maguire Industries, Inc., Nostrip Division, 2010 Broadway, New York 23, N. Y.*

• • •

Electrode Holder

Having a current rating of 300 amperes, with ample capacity for overload, a new holder for welding elec-



trodes weighs only 22 oz. This device will handle electrodes from $\frac{1}{8}$ to $\frac{1}{4}$ in. diameter.

The jaws, of copper alloy known as "Lincalloy," will withstand rough treatment, it is claimed, and are guarded from contacting the work by a

BARNES ... *the Pumps of Super-Achievement*

ALL OVER THE WORLD

WHEN the going's tough, when speed is a must ... supplying vital water for men and machines in combat areas . . . keeping shelled and mined ships afloat . . . setting the pace for fast moving Seabees and Army Engineers on rugged construction projects . . . refloating sunken ships in bottled harbors — all gruelling night and day tasks . . . Barnes pumps are doing a super-job.

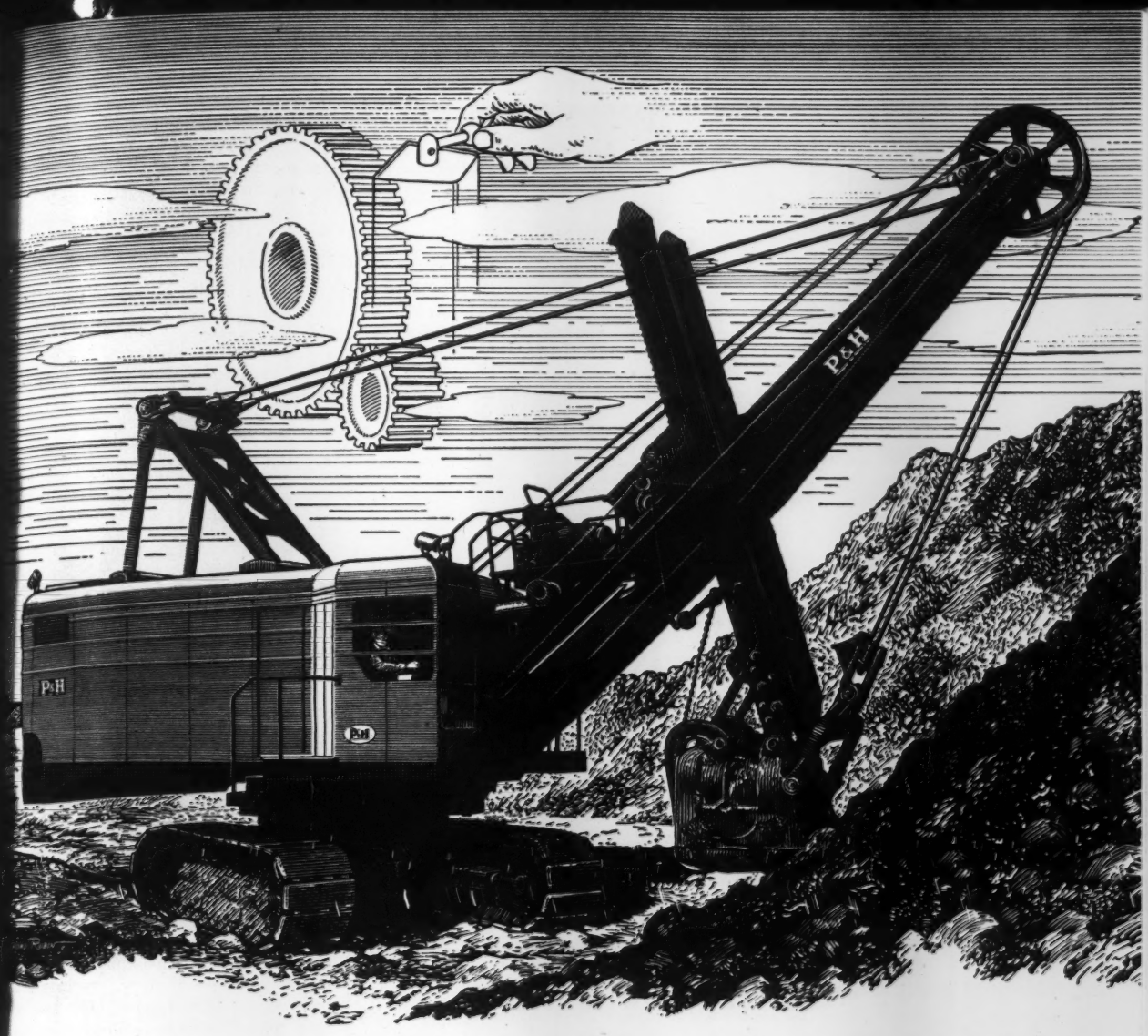
Yes, Barnes new Automatic Centrifugals, the pumps designed with stepped-up capacities, are performing wonders under war's severest conditions all over the world. Their trouble-free service has proved their worth at the front, in the jungles, and on the seas. That's why these new stream-styled Barnes pumps assure you of *more gallons of water for your pumping dollar.*

ATTENTION DISTRIBUTORS! *A number of territories are still available. Write, wire, or phone.*

BARNES MANUFACTURING CO.

Quality Pump Manufacturers for Nearly 50 Years

MANSFIELD, OHIO



We Switched Out The Trouble of Gear Shifting

Here is simplicity itself . . . absolute freedom from the mechanical complications of transferring power from one shovel motion to another.

Powered by its own heavy duty, shovel-type motor, the P&H propel machinery is completely independent of all hoisting and swinging motions. P&H's independent propel drive means simpler, easier move-ups . . . it means less trouble, less time out.

The change from dig to propel is instantaneous on a P&H Electric Shovel — accomplished by a mere flick of the master propel switch. Sliding gears and mechanical clutches with their complicated mechanisms are entirely eliminated — there is far more time for actual digging.

Here is another important advantage in the interests of lower tonnage costs for all kinds of open-pit operations. Behind it is P&H's 60-year leadership in applying electrical power to the movement of heavy loads.

P&H

ELECTRIC SHOVELS

4404 West National Avenue
MILWAUKEE 14, WISCONSIN

HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

THE GREATEST FORWARD STEP EVER MADE IN ELECTRIC SHOVEL DEVELOPMENT

Mr. Fillet Weld

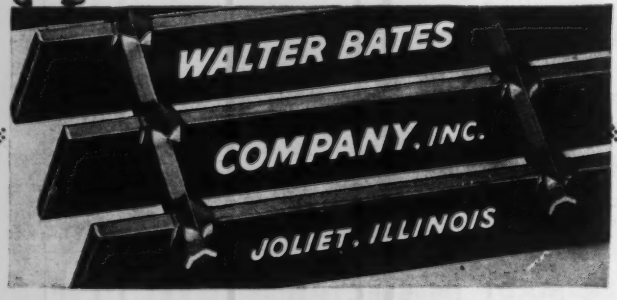
DOES A STRONG MAN ACT

● *Mr. Fillet Weld* is a tough guy. He holds together the Hex Cross Bars and the main bars of BATES • GRATES . . . and does it exceedingly well. In fact, the strength of BATES • GRATES exceeds all former standards set for open steel flooring and stair treads. That means BATES has greater basic load-carrying capacity.

that's only one reason why BATES • GRATES are better

● The greater strength factor is only one of the distinctive features of BATES • GRATES. The Fillet Welded Hex Cross Bars provide crisp, clean edges which give you non-slip grating for sure-footed safety. They are easier to clean and maintain. The design also allows maximum light and ventilation. All this adds up to:

Get a bid from BATES on every job where you need GRATES



durable spring steel guard. The trigger is of molded, heat-resisting inorganic material. The holder, operating on both AC and DC current, has a heat-resistant fiber handle, and holds the electrode securely at any angle.—*Lincoln Electric Co., Cleveland, Ohio.*

• • •

Portable Searchlight

Capable of projecting an intense beam more than 2,500 ft., the new "Big Beam" No. 411 portable electric hand searchlight will give the same volume of light over a wide area, by means of a snap-on lens. This searchlight is

powered by a heavy-duty shockproof 6-volt storage battery, rechargeable from any AC charger, DC line or light plant without removal from container. The lamp head can be turned in any direction, and stays adjusted.

The searchlight is said to be perfectly balanced for carrying, either by hand or with a shoulder strap; if a hold-down is used, the light can be anchored to any flat surface.—*U-C Lite Manufacturing Co., Chicago 11, Ill.*

• • •

Electro-Chemical Rustproofing

By means of electrodes suspended in the water, an electro-chemical method of rust prevention is said to completely stop rust in tanks, filters, etc., below the water level. The electrodes create a low-voltage, low-amperage electric current, which prevents corrosion by oxidation and builds up a protective hydrogen film.

This Rustop system of corrosion control is said to be simple and inexpensive to install, without draining the tank or otherwise interrupting service. In addition to preventing rust formation, it stops rusting in old tanks and loosens rust scales.—*Electro Rust-Proofing Corp., Dayton 10, Ohio.*

...Designed and Built by Steam Generator Experts

TRIM — compact — highly perfected, the Cleaver-Brooks Tank-Car Heater looks and performs like the "finished" product it is.

No other equipment equals Cleaver-Brooks in fast, low-cost, dependable performance—no other equipment has the original and exclusive four-pass, down-draft flue travel and integral fuel-oil burner construction, plus the *perfected* positive dry-coil method of condensate return.

Cleaver-Brooks design and construction provides more and better steam—faster with far less fuel and water. Hot, dry steam flows to car coils in 25 minutes or less —there is no "water-wagon" problem as every drop of condensate is returned to the car heater under pressure.

Cleaver-Brooks heaters are the perfected product of the pioneers and originators of tank-car heaters and bituminous boosters—built by specialists in the construction of portable and stationary steam generators for construction, industrial and military uses. Military engineers usually assign Cleaver-Brooks equipment to the difficult jobs—the hardest chores—because they recognize Cleaver-Brooks' proven capacity and reliability.

Available in two and three tank-car sizes — write for catalog and complete information today — for the jobs to come at war's end.

CLEAVER-BROOKS COMPANY
5107 NORTH 33rd STREET
MILWAUKEE 9, WISCONSIN

Cleaver-Brooks

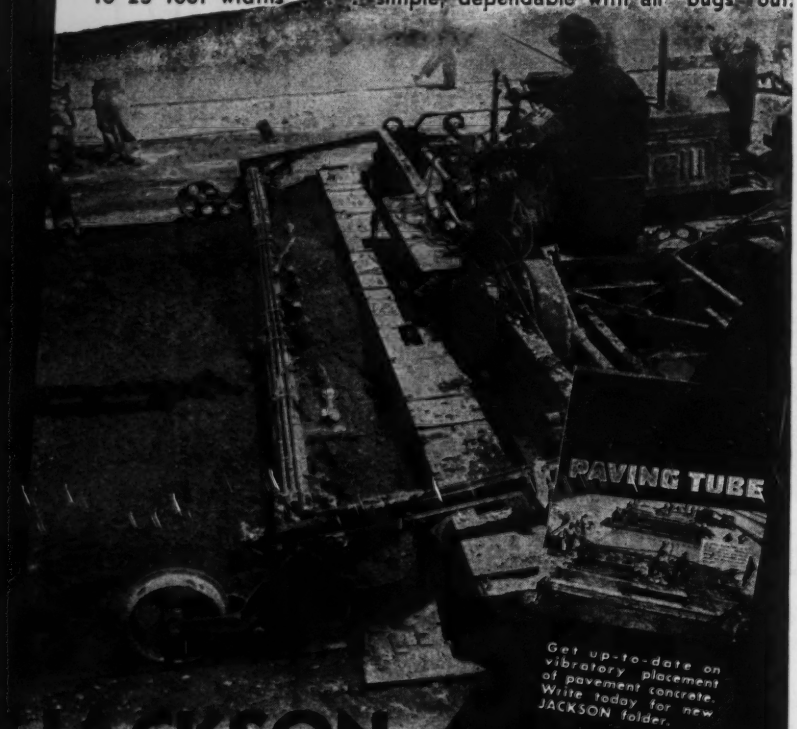
PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

for HIGHWAYS & AIRPORTS

The modern JACKSON Vibratory Paving Tube is the only full-width internal vibrator for highway and airport paving, backed by many years satisfactory use under widely varying conditions. Proved performance certifies to the contractor and engineer that they will get desired results in efficient and economical operation, placement, density, strength and wearing surface of the finished slab. This holds true for the usual mixes designed for vibratory placement and those made with air entraining cements.

The JACKSON Tube is super-powerful, with plenty of reserve beyond the toughest jobs encountered . . . is easily attached to any modern conventional finishing machine . . . available in 10 to 25 foot widths . . . simple, dependable with all "bugs" out.



Get up-to-date on vibratory placement of pavement concrete. Write today for new JACKSON folder.

JACKSON VIBRATORY PAVING TUBE

Standard, full-width, dual vibratory tubes submerged horizontally in concrete have proved most efficient through years of exhaustive tests and extensive use. Powerful high-frequency vibratory impulses are transmitted in force through the thickest slab, quickly transforming the stiffest mixes into uniformly workable condition. If desired, other types of vibratory elements can be easily substituted with the same basic frame and carriage.

The reserve capacity of the power plant can be used to run hand operated vibrators in conjunction with the tube. The power plant also generates power for electric tools and lights used on night clean-up or emergency operations.

THERE IS A RIGHT JACKSON CONCRETE VIBRATOR FOR EVERY JOB

MANUFACTURED FOR

JACKSON VIBRATORS, Inc.

by ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

Manufacturers' Publications

Deck covering—Described in a new folder is a mastic material claimed to provide a slip-proof, fire-resistant, non-corroding floor surface. The material dries quickly, adheres to steel, galvanized iron, and concrete. It is resistant to attack by gasoline and oils. A companion material is suited for application on the floors of locker rooms, hospitals and shower rooms. In addition to being slip-proof, it has germicidal qualities.—*The Paraffine Companies, Inc., 475 Brannan St., San Francisco, Calif.*

Air-entraining Cement—The development of air-entraining cement is outlined in a booklet. The product is said to make concrete more durable and more plastic. Illustrations give examples of a variety of uses.—*Universal Atlas Cement Co.*, 135 *East 42nd St., New York* 17, *N. Y.*

Water Deaeration—A reprint describes the application and general design of cold water deaerators to prevent corrosion of pipelines, heat exchange equipment, etc. This type of deaerator is said to have wide application in industrial plants, utilizing large quantities of cooling water.—*Cochrane Corp., 17th and Allegheny Ave., Philadelphia, 32, Pa.*

Material Pumps—A folder describes pumps designed to dispense and apply a wide variety of materials, including paints, lacquer, mastic, sealers, insulating materials, fibre and cement coatings, caulking compounds, etc. They operate on air power, and from one to six operators may work simultaneously using as many different spray heads and material lines from a single pump.—*Alemite Division, Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill.*

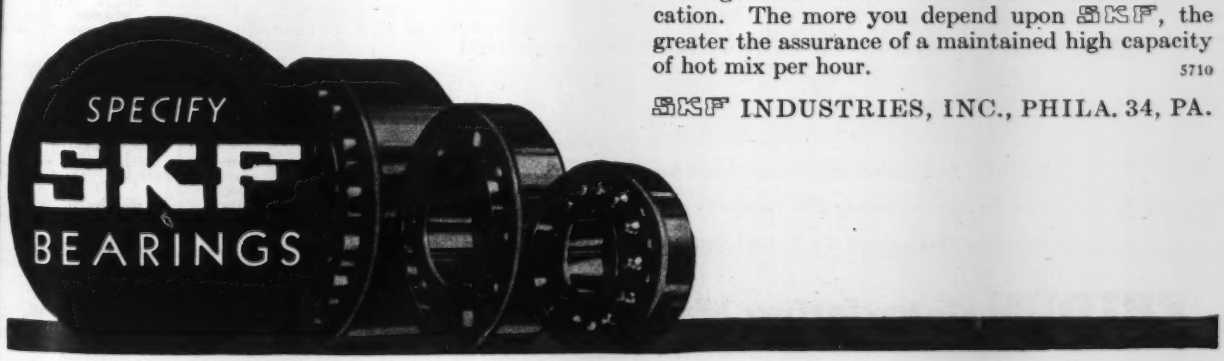
Bituminous Mixes—A booklet tells of a new combined stripping and stability test for bituminous mixes—laboratory findings substantiating field experience.—*Kotal Co.*, 52 *Vanderbilt Ave., New York, N. Y.*

Vertical Lift Doors—An attractive folder describes vertical lift doors for hangars. It is said that they save floor and wall space, prevent the door being hampered by equipment, snow, ice or swollen ground, and leave ceiling space completely clear.—*H. H. Robertson Co., Pittsburgh, Pa.*

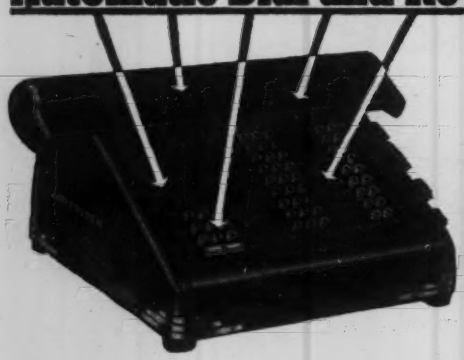
50 SKF's ASSURE HIGH TONNAGE

One SKF Pillow Block complete with bearing and adapter is a warranty of good performance, but multiply that by 50 and you can easily see why this Simplicity Asphalt Plant utilizes *every* advantage that goes with antifriction bearings. Some are on the trunnion rollers that impose heavy loads. Others are on the vibrating screen and the conveyor—at all points of greatest wear. Their presence signifies years of trouble-free performance . . . bearing protection against lubricant leakage and the entrance of dirt and liquids . . . bearings with all-time high capacity . . . shaft deflections, distortions or weave without bearing binding . . . bearing maintenance reduced to occasional lubrication. The more you depend upon SKF, the greater the assurance of a maintained high capacity of hot mix per hour. 5710

SKF INDUSTRIES, INC., PHILA. 34, PA.



FRIDĒN
Automatic Dial and Keyboard Clearance



Assures

- PERFECT ACCURACY
- INCREASED FIGURE OUTPUT
- MINIMUM OPERATOR EFFORT

HERE'S PROOF IN THE WORDS OF A FRIDĒN USER...

"I actually work thousands of problems without ever having to clear the dials or the keyboards. For on my new Fridēn Calculator they are *Cleared Automatically*, without effort or even thought on my part. There is absolutely no chance for uncleared dials or keyboards from previous problems to cause errors.

I can tell by the increased amount of work I turn out and by its perfect accuracy... as well as by how much better I feel at the end of the day... this one Fridēn Feature is worth its weight in gold to me."

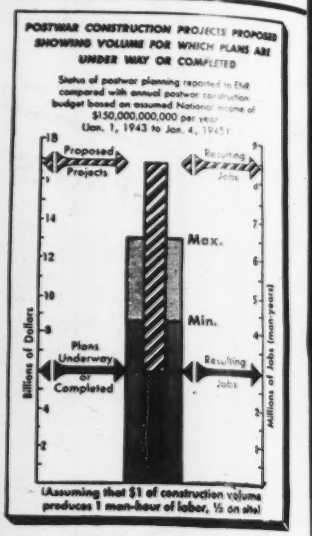
Telephone or write your local Fridēn Representative or the Home Office in San Leandro, California for complete information regarding these Calculators which are available, when applications for delivery have been approved by the War Production Board.

FRIDĒN Mechanical and Instructional Service is available in approximately 250 Company controlled Sales Agencies throughout the United States and Canada.

FRIDĒN Calculating Machine Co., Inc.

HOME OFFICE AND PLANT • SAN LEANDRO, CALIFORNIA, U. S. A. • SALES AND SERVICE THROUGHOUT THE WORLD

POSTWAR PROJECTS


POSTWAR CONSTRUCTION PROJECTS PROPOSED SHOWING VOLUME FOR WHICH PLANS ARE UNDER WAY OR COMPLETED
Status of postwar planning reported to Civil compared with annual postwar construction budget based on assumed National income of $150,000,000,000 per year
(Jan. 1, 1943 to Jan. 4, 1945)
Proposed Projects
Resulting Jobs
Max.
Min.
Plans Underway or Completed
Resulting Jobs
Billions of Dollars
Millions of Jobs (man-years)
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

PROPOSED WORK

Mass., Wellesley — Bd. Selectmen, Town Hall, enlarging Mangus Hill Reservoir. $28,000. Financing not provided.

N. Y., Dryden—Village, water supply addn. $30,500. State Aid Planning Funds allotted.

Tex., Austin—Travis Water Control & Imprvt. Dist. 3, Travis County, c/o Judge, Austin, plans water sys., connecting with city of Austin water supply. $30,000. Financing not available.

PLANS UNDER WAY

Idaho, Twin Falls—City, plans 25% completed watermains and laterials for recently annexed area. $450,000. Financing not provided. J. H. Hayes, city engr.

Kan., Parsons—City, enlarging water distr. sys. $25,000. Black & Veatch, 4506 Bway., Kansas City, Mo., consult. engrs. J. C. Harvey, city engr.

★ **Mass., Beverly**—City, City Hall, reservoir, pump. station and filter plant for imprv. water supply Beverly and Salem. $1,407,000. Metcalf & Eddy, Statler Bldg., Boston, consult. engrs., plans 80% completed 8 in. c.i. watermains. $113,000. R. E. Brown, Water Dpt., Roundy St., engr.

Mass., Newburyport—City, J. M. Kelleher, mayor, plans completed waterworks. $20,000.

N. J., Trenton—Mercer Co., Court House, plans 25% completed imprv. water supply and sewage disposal. $70,000. Financing not provided. Runyon & Carey, 31 Fulton St., Newark, consult. engrs.

★ **O., Toledo**—City of Toledo and Lucas Co., plan water service extens. $225,000; reinforcing main Dorr St. Dist. 8, $225,000; main Glendale Ave., Dist. 10, $75,500; H. P. Jones, of Jones & Henry, Toledo Trust Bldg., and C. S. Finkbeiner, of Finkbeiner, Pettis & Strout, Home Bank Bldg., consult. engrs.

Ore., Baker—City, plans 25% completed 10 m.g. reservoir. $109,000. H. L. Melton, City Hall, engr.

Ore., Coquille—City, City Hall, plans 50% completed reconstructing water sys. $49,447. J. N. Gearhart, City Hall, engr.

★ **Ore., Hillsboro**—City, plans 25% completed reconstructing water sys. $500,000. J. W. Barney, City Hall, engr. CD 1/21—ENR 2/10.

Ore., LaGrande — City, City Hall, plans 90% complete water purification plant, $35,000; completing water supply sys. $15,297. J. L. Sinden, City Hall, engr.

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POSTWAR PROJECTS (Cont'd.)

Ore., McMinnville—City plans 40% completed pipeline **$90,000**; water distr. sys. **$30,000**; reservoir **$100,000**. L. Courtemanche, Jr., City Hall, engr.

Ore., Myrtle Point—City, City Hall, plans completed reconstructing water pipeline, **$55,000**. Financing not provided. C. Lehmanowsky, City Hall, engr.

Ore., Reedsport—City, City Hall, water sys. **$26,750**. C. H. Bennett, City Hall, engr.

Ore., Union—City, reconstructing water sys. **$35,000**. W. Richards, City Hall, engr.

Ore., Yoncalla—City, City Hall, water sys. **$30,000**. W. H. Boak, City Hall, engr.

READY FOR BIDS

Ore., Bend—City, plans completed expansion water sys. **$100,285**. C. G. Reiter, City Hall, engr.

Ore., Gearhart—City, plans completed reconstructing water sys. **$40,000**. A. Danielson, City Hall, city engr.

CONTRACTS AWARDED

Kan., Abilene—City, will replace 45,000 lin. ft. 4 and 6 in. c.i. mains, by own forces. **$125,000**. W. F. Johnson, City Hall, engr. CD 9/28—ENR 10/19.

PROJECTS CANCELLED.

Alta., Lethbridge—Municipality cancelled plans for 18 in. c.i. watermain. **$100,000**. Work going ahead at once. J. T. Watson, City engr. CD 9/30—ENR 10/7.

Ont., Grand Bend—Municipality, cancelled water sys. **$40,000**. Project going ahead. G. G. Reid, 7 Edmund Ave., Toronto, engr. CD 11/2—ENR 12/1.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Kan., Marysville—H. A. Hohn, city clk., plans sewers. **$25,000**.

N. Y., Mount Vernon—City, reconstructing trunk sewers in S. Fulton and Langdon Avs. **$95,000**; E. 4 St. and Tecumseh Ave., **$28,000**. State Aid Planning Funds allotted.

N. Y., Spring Valley—Village, sanitary sewer line, imprv. sewage plant. **$35,000**. State Aid Planning Funds allotted. CD 4/21—ENR 5/4.

Ore., Yamhill—City, sewage disposal plant. To exceed **$25,000**.

N. S., Antigonish—Municipality, C. H. Chisholm, clk., City Hall, sewerage sys. **$60,000**.

Ont., Casselman — Municipality, J. L. Quesnee, clk., sewerage sys. **$25,000**.

PLANS UNDER WAY

Idaho, Twin Falls—City, plans 25% completed sewer mains and laterals for area recently acquired by city. **$135,000**. J. E. Hayes, city engr.

Kan., Parsons—City, enlarging sewage disposal plant. **$25,000**. Black & Veatch, 4706 Bway., Kansas City, Mo., consult. engrs. J. C. Harvey, city engr.

Mass., Adams—Town, A. J. Strzepek, supt., plans sewage disposal plant, incinerator. **$250,000**. Brown & Matthews, Inc., 122 E. 42 St., New York, N. Y., consult. engrs.

★**Mass., Beverly**—City, City Hall, vitr. clay sanitary sewers, pump. station, filtration plant. **$500,000**. E. G. Mitchell, City Hall, city engr.

★**Mass., Fall River**—City, City Hall, plans 80% completed storm and sanitary sewers, connected to proposed trunk line sewer and treatment plant, concrete pipe, brick manholes, 1,500 ft. tunnel, concrete culverts, 2 mi. storm sewer in Quequecan River. **$5,000,000**; plans 40% completed trunk line sewers, treatment plant connecting 17 sewer outlets to treatment plant, 1,400 ft. tunnel construction, 2 pump. stations, incinerator at treatment plant, 3,200 ft. outfall sewer in Taunton River, **$3,000,000**. T. J. Logan, City Hall, comr. P. Wks. Financing not provided.

Mass., Lawrence—City, plans under way 18,000 lin. ft. sanitary sewers, **$90,000**; 5,780 lin. ft. surface water sewers, **$46,240**; plans 175 ton incinerator, **$185,000**. F. A. Blackstock, city engr. CD 8/23—ENR 9/7.

Mich., Detroit—Dpt. Parks & Recreation, 735 Randolph St., plans 50% completed 6,200 ft. 6 in. c.i. sewer and 2 pump. stations for Central Ave. Sewer Exten. **$100,000**. G. R. Thompson, City Hall, engr.

Mich., Marshall—City, plans 60% completed sanitary sewerage sys., **$25,000**; plans trunk line storm sewer, **$127,340**. V. D. Camp, city engr. CD 10/25 and 11/6—ENR 11/16.

Minn., Perham—Village, A. M. Stoll, clk., sanitary sewers. **$25,000**. W. C. Larson, Detroit Lakes, consult. engr.

Minn., Sebeka—Village, A. J. Pudas, clk., sanitary sewer and waterworks. Over **$40,000**. W. C. Larson, Detroit Lakes, consult. engr.

N. J., Rahway—City, City Hall, plans under way storm sewers **$200,000**; sanitary sewers **$100,000**. Financing not provided. C. S. Bush, city engr.

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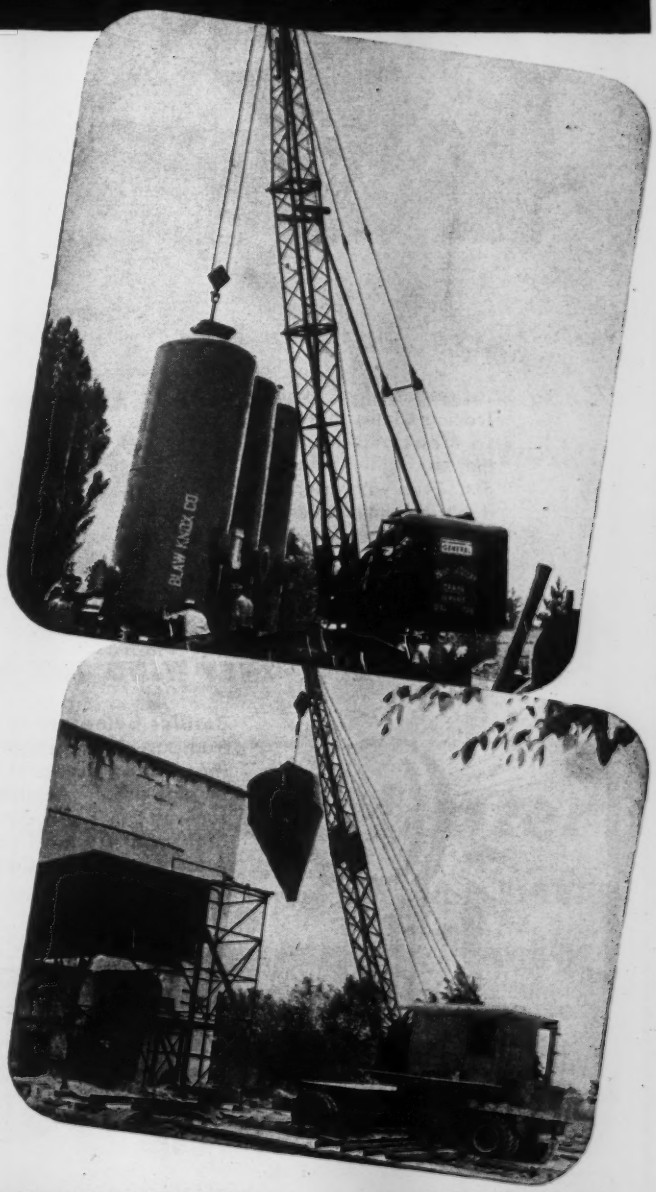

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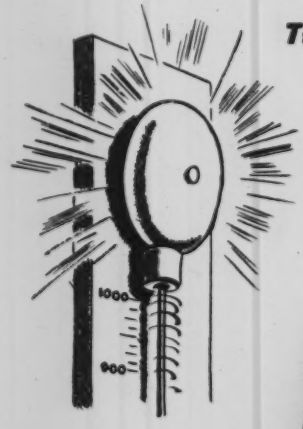

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POSTWAR PROJECTS (Cont'd.)

★**N. Y., Brooklyn**—Dpt. P. Wks., I.V.A. Huie, comr., Municipal Bldg., New York 7, plans under way. Owls Head Sewage Treatment Works. **$10,460,000.** R. H. Gould, Dir. Engrg. CD 10/20—ENR 11/2.

★**N. Y., Brooklyn**—Dpt. P. Wks., I.V.A. Huie, comr., Municipal Bldg., New York Zone 7, plans under way 26 Ward Sewage Treatment Plant, PW-19. **$2,780,000.** R. H. Gould, Div. dir. Engrg.

★**O., Toledo**—City of Toledo and Lucas Co., plan intercepting sanitary sewer in Glendale Ave., Dist. 10, **$61,250**; Laskey Rd., Dists. 4 and 9, **$310,000**; main sanitary sewer, Douglas Rd. **$450,000**; Dorr St., Dist. 4, **$1,350,000.** H. P. Jones, of Jones & Henry, Toledo Trust Bldg., and C. S. Finkbeiner, of Finkbeiner, Pettis & Strout, Home Bank Bldg., consult. engrs.

O., Toledo—Lucas Co., preliminary plans MacCord Rd. Drain, **$33,000**; Bancroft St. Drain, **$16,000.** B. G. Kesting, co. engr.

Ore., Clatskanie—City, City Hall, sewage disposal plant. **$35,000.** R. E. Culbertson, City Hall, engr.

Ore., Independence—City, City Hall, exten. sewerage sys. **$27,000.** M. M. Nelson, City Hall, engr.

Ore., LaGrande—City, City Hall, plans garbage disposal plant, **$50,000**; plans 90% complete exten. sewerage sys. **$22,402.** J. L. Sinden, City Hall, engr.

Ore., Lakeview—City, City Hall, plans 20% completed exten. sewerage sys. **$25,000.** W. E. Sandquist, City Hall, engr.

Ore., McMinnville—City, City Hall, plans 40% completed sewage disposal plant **$200,000.** L. Courtemanche, Jr., City Hall, engr.

Ore., Newberg—City, sewage disposal plant, To exceed **$25,000.** Cunningham & Associates, Spalding Bldg., Portland, consult. engrs.

Ore., Phoenix—City, City Hall, sewerage sys. **$30,000.** E. Loucks, City Hall, engr.

Ore., Salem—City, City Hall, plans 20% completed sewerage sys. **$115,000.** J. H. Davis, City Hall, engr. CD 6/19—ENR 7/13.

Wis., Cudahy—City, constructing, repairing storm and sanitary sewers. **$92,000.** H. C. Webster & Son, 739 N. 2 St., Milwaukee 3, consult. engr.

Wis., Delavan—City, sewage treatment plant. **$25,000.** L. Jensen, Elkhorn, consult. engr.

Ont., Lindsay—Town, C. Lamb, mayor, W. A. Alley, clk., Town Hall, incinerator and sewage disposal plant. About **$120,000.** James, Proctor & Redfern, Ltd., Excelsior Life Bldg., Toronto, engrs.

READY FOR BIDS

Ill., Jacksonville—City, plans completed sewers in North Main St., etc. **$33,677.** Will be financed from motor fuel tax. E. Henderson, City Hall, city engr. CD 7/19—ENR 7/27.

★**Mich., Detroit**—Dpt. P. Wks., City Hall, plans completed 3.75 mi. 10 ft. diam. concrete sewer from end of present 10 ft. sewer north of Airport Dr. to Oakwood Intercepter siphon, Fort and Bayside Aves. **$3,200,000**; Part B, McNichols-Seven Mile Rd. Relief Sewer, Hamilton Relief Sewer, 6 relief outlets to river, **$6,000,000**; Part C, McNichols-Seven Mile Relief Sewers, Conant-Mount Elliott Relief Outlet to River, **$5,700,000.** G. R. Thompson, City Hall, engr. CD 8/8—ENR 8/24.

Ore., Baker—City, plans completed sewerage sys. **$140,000.** H. L. Melton, City engr.

Tex., San Antonio—City, plans completed 70 in. concrete storm sewer across Bway. into Brackenridge Park. **$200,000.** M. L. Diver, 1404 Main Ave., consult. engr. T. Coghill, City Hall, city engr.

PROJECTS CANCELLED.

Ont., Grand Bend—Municipality cancelled sewerage sys. **$50,000.** Project going ahead. G. G. Reid, 7 Edmund Ave., Toronto, engr. CD 11/2—ENR 11/16.

BRIDGES

PROPOSED WORK

Mass., Adams—Town, plans bridge, Route 8. **$30,000.** A. J. Strzepek, supt. streets.

★**Washington**—State Hy. Dpt., B. Bantz, dir., Olympia, bridge between Bremerton and Manette, Kitsap Co. **$2,225,000.**

New Brunswick and Quebec—Province of New Brunswick, Fredericton, N. B., and Province of Quebec, Quebec City, Que., plan bridge from Campbellton, N. B. to Cross Point, Que. **$100,000.**

★**Que., Sherbrooke**—Municipality, bridge over the St. Francois River. **$600,000.**

★**Ia., Sioux City**—City, bridge over Missouri River, **$1,000,000.** $250,000 bonds voted. Sverdup & Parcel, 1848 Railway Exch. Bldg., St. Louis, Mo., consult. engrs.

Mass., Lawrence—City, plans concrete bridge over Shawshee River. **$25,000.** F. A. Blackstock, Lawrence, city engr. CD 8/23—ENR 9/7.

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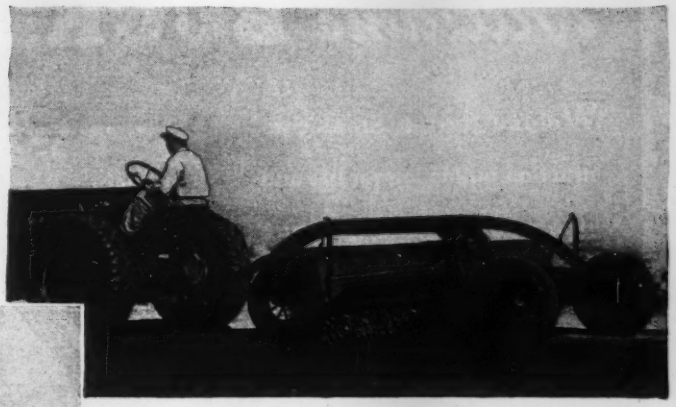

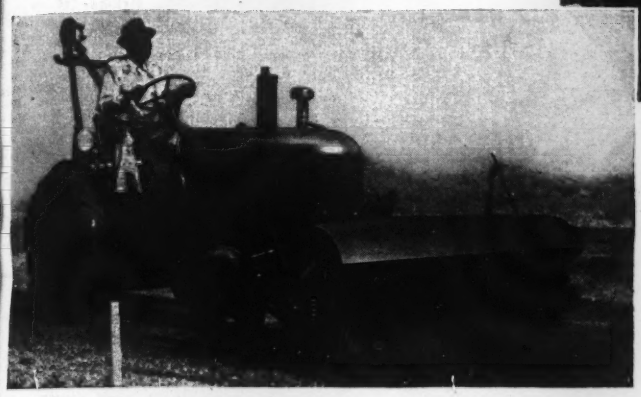

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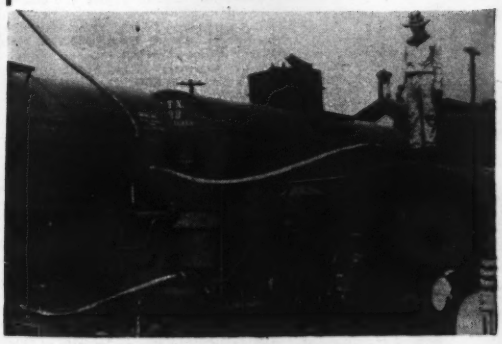

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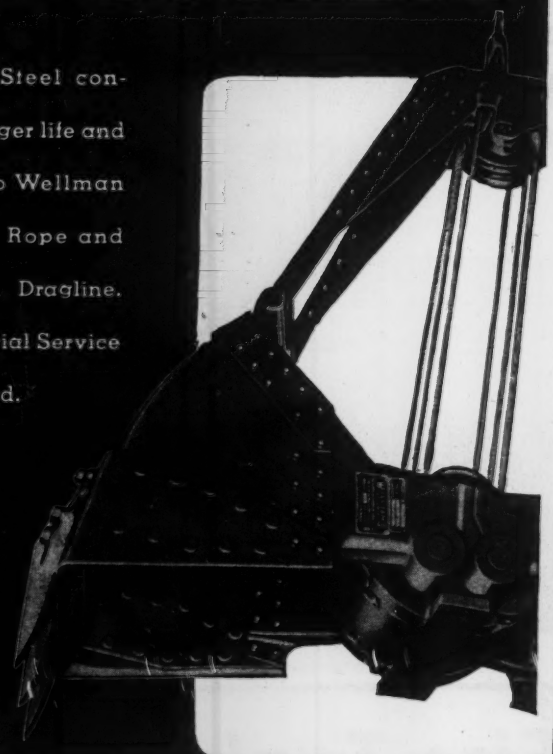

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POSTWAR PROJECTS (Cont.)

Mich., Grand Rapids—Kent Co. Rd. Comm., 1550 Scribner Ave. N.W., 30 ft. span and 36 ft. span concrete deck girder bridges, $83,000. O. S. Hess, 1500 Scribner Ave. N.W., Grand Rapids 4, co. engr.

Mich., Ithaca—Gratiot County Rd. Comm., Ithaca, plans 50% completed constructing 6 bridges, **$80,000.** G. M. Foster, Rauch Bldg., Lansing, consult. engr. CD 10/23—ENR 11/16.

Missouri—State Hy. Dpt., Jefferson City, plans 90% complete one 80 ft., two 55 ft., three 35 ft. concrete bridges over Flat Creek on Route SC, Project FAS, 14[illegible], Pettis Co., **$34,000;** two 40 ft., two 35 ft. rein.-con. deck girder spans, on Van Buren-Poplar Bluffs Rd., Route 60, FA 550[illegible], Carter Co., **$36,000.** Land rights not cleared, financing not provided. C. W. Brown, Jefferson City, ch. engr.

N. J., Hancocks Bridge—Salem Co., 94 Market St., Salem, 3 span, 190 ft. rein.-con. bridge on pile fdn., possible bascule or lift, **$230,000.** H. H. Skinner, 90 Market St., Salem, co. engr.

★**N. J., Trenton**—Mercer Co., Court House, bridges, culverts. **$700,000.** Financing not provided. H. A. Kersey, engr. in charge of bridges.

★**N. Y., Brooklyn**—Dpt. P. Wks., I.V.A. Huie, comr., Municipal Bldg., New York, Zone 7, Grand St. Bridge over Newtown Creek. PW-31. **$1,150,000.** R. H. Gould, Dir. Div. Engrg.

★**O., Toledo**—Lucas Co., preliminary plans Bridge 2, Lathrop Rd. **$15,750;** Bridge 8, Brint Rd. **$17,000;** Bridge 105, Brint Rd. **$17,100;** Bridge 108, Harroun Rd. **$28,000;** Bridge 397, Wilkins Rd. **$21,700;** Bridge 727, Monclova Rd. **$28,000;** Bridge 777, Whitehouse-Spencer Rd. **$24,500;** Bridge 1238, Westwood Ave. **$31,500;** Bridge 1454, Decant Rd. **$15,750;** Bridge 1467, Cousino Rd. **$13,400;** Bridge 1766, Donovan Rd. **$14,000;** Following in idea stage: New York Central-Holloway Rd. Grade Separation, **$300,000;** New York Central-Holland-Sylvania Rd. Grade Separation, **$300,000;** T.T.R.R.-Pere Marquette-Matzinger Rd. Grade Separation, **$750,000;** New York Central-Byrne Rd. Grade Separation, **$750,000;** Wheeling & Lake Erie R.R. Corduroy Rd. Grade Separation, **$300,000;** Wheeling & Lake Erie R.R.-Otter Creek Rd. Grade Separation, **$300,000.** B. G. Kesling, co. engr. CD 11/18—ENR 11/25.

Ore., Medford—City, City Hall, plans 10% completed bridge over Bear Creek. **$50,000.** D. T. McDonough, Medford, city engr.

STREETS AND ROADS

PROPOSED WORK

Kan., Marysville—H. A. Hohn, city clk., plans paving repair. **$50,000.**

★**Md., Baltimore**—City, City Hall, constructing sunken expressly across Baltimore from east to west, along line of Franklin and Orleans Sts. to connect Phila. Rd. and Washington Blvd. **$40,360,000.**

★**Mass., Fall River**—City, City Hall, grading, surfacing 100 mi. streets; bituminous concrete asphalt 50 mi. streets; granite curbing 60 mi. sidewalk. **$2,500,000.** Financing not provided. T. J. Logan, P. Wks., City Hall.

Mass., Milton—Town, imprv. and constructing streets, deepening, widening, straightening brook, **$100,000.** Land right not cleared. Financing not provided.

N. Y., Champlain—Town, reconstructing Bostick-Leggett-Hayford Rds. **$62,700.** State Aid Planning Funds allotted.

N. Y., Mount Vernon—City, reshaping, resurfacing W. 1 St., **$99,800;** S. 4 St., **$20,000;** Beach St., **$18,000;** Rich Ave., **$85,100;** N. Fulton Ave., **$87,650;** Hawthorne Terrace, **$27,000;** Sheridan Blvd., **$78,200;** Summit Ave., **$17,800.** State Aid Planning Funds allotted.

PLANS UNDER WAY

★**Idaho, Twin Falls**—City, plans 10% completed imprv. paving streets, alleys, walks and curbs. **$600,000.** Will vote bonds. J. E. Hayes, city engr.

Ia., Rockwell City—Calhoun Co., Rockwell City, plans 75% complete grading, draining, graveling 32.7 mi. county trunk roads, **$128,700;** plans 15% completed 48 mi. state and county roads, **$62,655.** F. W. Akers, Rockwell City, co. engr.

Kan., Parsons—City, plans under way repairing streets. **$200,000.** J. C. Harvey, city engr.

★**Md., Frederick**—Frederick Co. Rds. Bd., Court House, plans 10% completed penetration macadam paving or stabilizing 200 mi. roads over 5 year period. **$500 000.** R. H. Willard, Court House, co. roads engr.

Mass., Adams—Town, A. J. Strzepek, supt. Streets, plans reconstructing streets. **$75,000.** H. C. Neff, Crandall St., Adams and A. B. Wright, Massachusetts Ave., North Adams, engrs.

Mass., Beverly—City, plans 70% completed drainage, 7 in. bituminous macadam on 4 in. stone paving streets **$263,000;** plans 50% completed 1 in. on 4 in. concrete sidewalk reconstruction, **$112,500.** E. G. Mitchell, City Hall, city engr.

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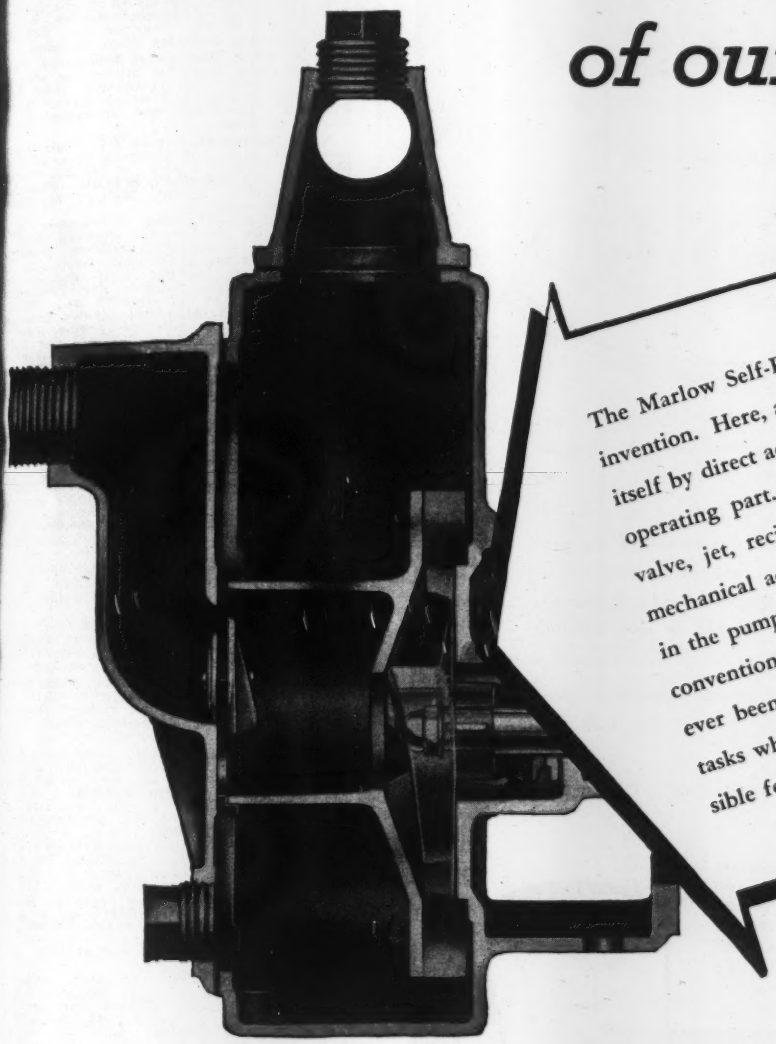

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LANSING 5, MICHIGAN

POSTWAR PROJECTS (Cont'd.)

Mass., Lawrence—City, plans under way bituminous macadam paving streets. $100,000. F. A. Blackstock, city engr. CD 8/21—ENR 9/7.

Mich., Detroit—Dpt. Parks & Recreation, 735 Randolph St., Detroit, plans 2% completed roads and bridges for Belle Isle. $1,637,000. G. R. Thompson, City Hall, engr.

★**Mich., Grand Rapids**—Kent Co. Rd. Comm., 1500 Scribner Ave. N.W., surveys underway grading, graveling, bituminous surfacing 50 mi. roads $1,500,000. O. S. Hess, 1500 Scribner Ave. N.W., Grand Rapids 4, engr. mgr. CD 10/23—ENR 11/3.

Mich., Ithaca—Gratoit County Rd. Comm., Ithaca, plans 75% completed imprv. roads, $50,000. G. M. Foster, Bauch Bldg., Lansing, consult. engr. CD 10/25—ENR 11/15.

Mich., Marshall—City, widening pavement, $92,000. V. D. Camp, Marshall, city engr.

Missouri—State Hy. Comm., Jefferson City, plans 90% completed grading, concrete surfacing 4.876 mi. Salisburg East Rd., Rt. 24, Proj. FA 795 F1, Chariton Co., $330,500. C. W. Brown, Jefferson City, ch. engr.

N. J., Cape May Court House—Bd. Freeholders Cape May Co. bituminous concrete paving Ocean City-Townsends Inlet Rd., Sea Isle, Avalon and Stone Harbor Blvds. $400,000. Financing not available. R. A. Sharp, co. engr.

N. J., Elizabeth—Union Co., Court House, paving Hillside and Chestnut Aves., Hillside, $120,000; Mountain Ave., in Summit, $85,000; E. Front St., Plainfield, $256,600. Financing not provided. J. W. Meixell, Jr., Court House, co. engr.

★**N. J., Newark**—Bd. Freeholders Essex Co., Hall of Records, Newark, Zone 1, plans 90% completed, grading, draining, granite curbing, sidewalks, bituminous on plain concrete paving East Passaic and Watchung Aves., Centre St., Pilch and Sadler Rds., in Bloomfield and Nutley, PWS-1 Item 17, $135,000; grading, bituminous concrete on concrete paving, curbing Bloomfield Ave., West Caldwell and Caldwell, PWS-1 Item 10C, $125,000; Springfield Ave., Irvington, PWS-1, Item 11, $118,000; River Rd., PWS-1, Item 13, Sect. A, Nutley $50,000; Franklin Ave., PWS-1, Item 14, Belleville and Nutley, $105,000; plans 90% completed Grove St., PWS-1, Item 15, Sect. A, Montclair, $120,000; plans 50% completed Prospect Ave., PWS-1, Item 16, West Orange and Verona, $110,000; plans widening right of way, demolishing bldgs., grading, drainage, bituminous on concrete paving Bloomfield Ave., PWS-1, Item 10A, Newark, $2,500,000; exten. 6 lane hy. State Hy. 25A, PWS-1, Item 12, Newark, $1,000,000. C. C. Colwell, Hall of Records, Newark 2, co. engr. Financing not provided.

N. J., Rahway—City, City Hall, plans under way 7 in. bituminous macadam paving, $100,000. Financing not provided. C. S. Bush, Rahway, city engr.

N. J., Salem—Salem Co., 90 Market St., plans 40% completed rein.-con. surfacing 0.739 mi. $92,000. Financing not provided. H. H. Skinner, 90 Market St., co. engr.

★**N. J., Trenton**—Mercer Co., Court House, plans 25% completed imprv. roads. $1,800,000. Land rights not cleared, financing not provided. E. M. Storer, Court House, engr. in charge of highways.

★**O., Toledo**—Lucas Co., preliminary plans 1 mi. Brindley Rd. $36,000; 2.75 mi. Corey Rd. $100,000; 3 mi. Garden Rd. $108,000; 1 mi. Harroun Rd. $36,000; 3 mi. Kilburn Rd. $108,000; 5 mi. Monclova Rd. $180,000; 2 mi. Murd Rd. $72,000; 3.7 mi. Washburn Rd. $132,000; 0.31 mi. Worden Rd. $11,000; 7 mi. Brown Rd. $172,000; 1 mi. Douglas Rd. $61,000; 4 mi. Pickle Rd. $100,000; 3.5 mi. Richfield Center Rd. $32,000; Following projects in idea stage: 3.75 mi. Raab Rd. $112,000; 2.5 mi. Scott Rd. $90,000; 4.5 mi. Shaffer Rd. $165,000; 1 mi. Soul Rd. $36,000; 2 mi. State Line Rd. $72,000; 3.75 mi. Wilkins Rd. $135,000; 1 mi. Jackman Rd. $42,000; 1.7 mi. Richards Rd. $45,000. B. G. Kesting, co. engr.

★**O., Toledo**—Lucas Co. plans underway 1.94 mi. Clarion Ave. $60,000; 5.5 mi. King Rd. $198,000; 0.5 mi. Mitchaw Rd. $18,000; 0.53 mi. Bowen Rd. $22,000; 0.45 mi. Jutland Ave. $26,000; 0.38 mi. Sylvandale Ave. $15,000; 0.11 mi. Whitmer Dr. $6,200; 1.5 mi. Teachout Rd. $62,000; 0.3 mi. Ottawa River Rd. $40,000; 9.5 mi. Brint Rd. $232,000; 7 mi. Cedar Point Rd. $172,000; Bridge 1471, Yondota Rd. $16,800. Funds available. B. G. Kesting, county engr. CD 11/18—ENR 11/25.

★**Oregon**—State, Salem, plans completed trails and roads through state forests, $2,408 060; constructing 288 miles firebreaks, 499 miles roadside cleanup, snag felling 73,500 acres, 301 mi. telephone lines, $1,151,212; fire lookout towers, $505,262; State Forest Nursery, in Clatsop Co., $44,691. Financing not provided. N. S. Rogers, Capitol, Salem, engr.

Ore., Hillsboro—City, City Hall, plans completed resurfacing city streets and widening 6 blocks city streets. $150,000. Financing not provided. J. W. Barney, City Hall, Hillsboro, engr.

Ore., Lakeview—City, City Hall plans 20% completed paving streets. $50,000. W. E. Sandquist, City Hall, engr. CD 6/19—ENR 7/13.

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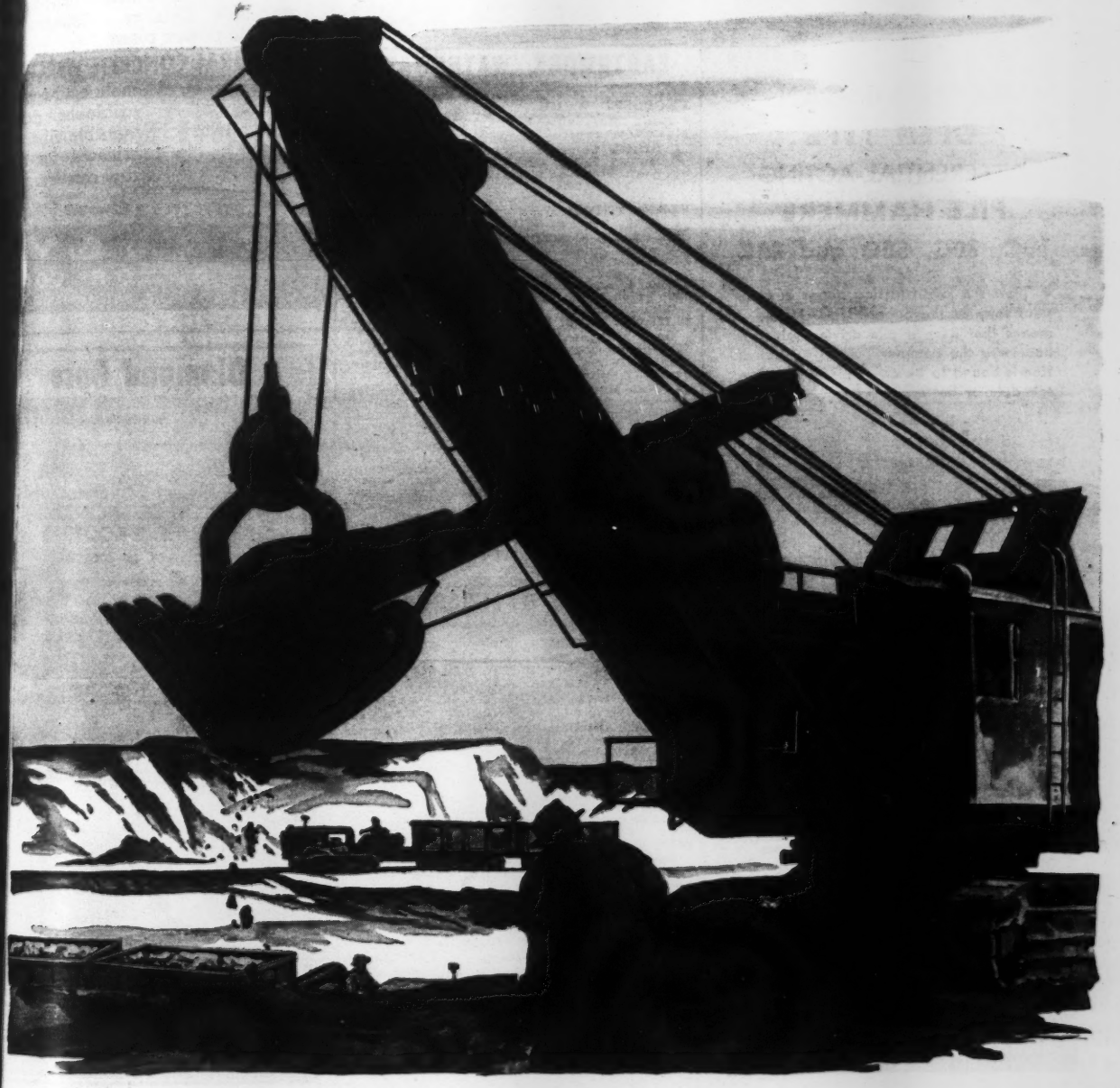

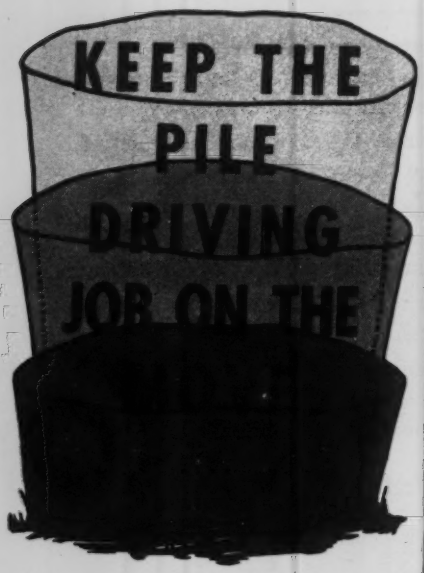

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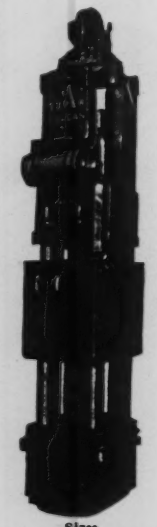

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POSTWAR PROJECTS (Cont'd.)

Ore., Salem—City, plans 20% completed paving 90 city blocks. **$90,000.** J. H. Davis, City engr.

Ore., The Dalles—City, City Hall plans 50% completed curbing and sidewalks **$109,956**; paving streets **$89,918.** C. P. Fauerso, City Hall, engr.

READY FOR BIDS

Ill., Jacksonville — City, plans completed widening, concrete paving E. Douglas Ave., North Main, Sandy, Court, West, Morgan, South East, Mauvisterre, Sts., in Luke Dist. **$88,584.** Financing from motor fuel tax. E. Henderson, City Hall, city engr. CD 8/4—ENR 8/24.

Mass., Newburyport—City, J. M. Kelleher, mayor, plans completed road **$57,900**; 8 roads **$43,870**; sidewalks **$75,000.**

★**O., Toledo**—Lucas Co., plans completed 2.85 mi. Laskey Rd., **$144,189**; 1.34 mi. Pearson Park Rds., **$99,262**; 0.58 mi. Front and Clark Sts., **$25,058**; 0.23 mi. Maumee Side Cut Park, **$16,017**; 2.12 mi. Centennial Rd., **$101,281**; Glenn and Burdett Sts. **$19,000**; 2.31 mi. Holloway Rd., **$81,000**; 2 mi. South Ave., **$80,000**; 0.5 mi. Mambrino Rd., **$25,000**; 1 mi. Yondota Rd., **$42,000**; 0.5 mi. Wheeling St., **$38,000**; Clarion Ave. Bridge 2260, **$14,000.** Funds available. B. G. Kesting, co. engr.

CONTRACTS AWARDED

Mass., Wellesley—Bd. Selectmen, Town Hall, will imprv. streets by own forces. To exceed **$25,000.** Financing not provided.

EARTHWORK, WATERWAYS

PROPOSED WORK

Kan., Marysville—H. A. Hohn, city clk. plans flood control. **$25,000.**

★**British Columbia**—Ministry of Fisheries Hunter Bldg., Ottawa, Ont., breakwater at Wiah Point and Zayas Island in Skeena River. **$1,550,000.**

PLANS UNDER WAY

★**Calif., El Centro**—Imperial Irrigation Dist., El Centro, 33,000 kw. hydro-electric plant on All American Canal, **$5,500,000**; developing 10,000 acres on East Mesa, flood control and protection channelization of Alamo River, imprv. irrigation sys. **$9,325,000**; exten. drainage sys., power sys., maintaining canals, employee housing, etc. **$2,155,000.** M. J. Dowd, El Centro, ch. engr.

Ore., McMinnville—City, City Hall, plans 40% completed raising Haskins Creek Dam and spillways. **$125,000.** L. Courtemanche, Jr., City Hall, engr.

★**Tex., Houston**—Harris County Navigation Dist., Court House, imprv. ship channel, **$1,250,000**; widening, straightening channel, **$250,000.** Bonds voted. CD 11/22—ENR 12/14.

N. B., Saint John—Dominion Govt., Ottawa, Ont., removing reef from harbour. **$50,000.** National Harbours Bd., Ottawa, Ont., engr.

READY FOR BIDS

R. I., Woonsocket — City, W. E. Baillargeon, comr. P. Wks., City Hall, plans completed core dam. **$15,000.**

PUBLIC BUILDINGS

PROPOSED WORK

Idaho, Albion—Albion Normal School, remodeling Hansen Hall, infirmary and training school. **$260,250.**

★**Idaho, Boise**—State, plans office bldg. for State Capitol. **$500,000.**

Idaho, Gooding—State Deaf & Blind School, Gooding, girls' cottage and utility bldg. **$163,500.**

Idaho, Lewiston—Lewiston Normal School, infirmary and science hall. addn. **$180,000.**

★**Idaho, Pocatello**—University of Idaho, Southern Branch, Pocatello, plans central heating plant, Liberal Arts Bldg., swimming pool, infirmary and gymnasium. **$902,500.**

Idaho, Twin Falls—Twin Falls Co., Court House, plans hospital addn., power house. **$450,000.**

Ill., Jacksonville—City, City Hall, civic center. **$250,000.**

La., Franklinton—City, M. Bickham, mayor, city hall. **$150,000.** Plans bond election.

La., New Iberia—Iberia Parish Police Jury, New Iberia, veterans memorial center. **$150,000.** Bonds voted.

★**Md., College Park**—University of Maryland, plans College of Aeronautical Education and Research. **$1,700,000.** Funds available.

Mass., Danvers—Town, plans brick, steel hospital for Hunt Memorial Hospital. To exceed **$150,000.**

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POSTWAR PROJECTS (Cont'd.)

★**Mass., Fall River**—City, City Hall, plans 5 fire stations, $250,000; City Hospital addn., $400,000; school, $500,000; 1 story children's unit addn. at Tuberculosis Hospital, plus some $30,000 ground improvts.; city hall annex, with tunnel, $400,000; garage, $1,000,000. T. J. Logan, City Hall, consult. P. Wks.

★**Minn., St. Paul** — State of Minnesota, Governor's Advisory Comm., 10 State Capitol, plans war memorial bldg. Summit Ave. and St. Peter St. $1,000,000. Land rights not cleared, financing not provided.

★**N. Y., Buffalo**—City, reconstructing fire and police stations. $700,000. State Aid Planning funds allotted.

★**N. Y., Hempstead**—Town, school for U.F.S.D. No. 9, North Hempstead. $[illegible] 000. State Aid Planning Funds allotted.

N. Y., Newcomb—Central School Dist. No. 1, Newcomb, Central School, developing site. $181,720. State Aid Planning Funds allotted.

★**N. Y., Wilson**—Central School Dist. No. 1, Newfane and Wilson, Central School addn. and garage. $609,000. State Aid Planning Funds allotted.

N. Y., Wilson — Village, Central School addn. for Wilson Central School Dist. $266,340. State Aid Planning Funds allotted.

★**Ore., Corvallis**—State Bd. Higher Education, Eugene, athletic pavilion and physical education bldg. $500,000, men's dormitory $450,000, agricultural bldg. $370,000, women's dormitory $300,000, electrical engineering wing $200,000, at University of Oregon.

★**Ore., Eugene**—State Bd. Higher Education, Eugene, natural history museum $600,000, library addn. $330,000, women's dormitory addn. $250,000, Condon Hall addn. $175,000, speech and dramatic arts bldg. $150,000, all at University of Oregon.

Ore., Pendleton—Umatilla Co., plans court house. $285,000.

★**Ore., Portland**—State Bd. Higher Education, Eugene, hospital, at Medical School, University of Portland. $750,000.

Tex., Grand Prairie—Pub. School Bd. plans school $150,000; Junior High School $250,000. Plans bond election.

★**Tex., San Antonio**—Bd. Trustees Bexar Co., Junior College Dist., Natl. Bank Com. Bldg., School No. 1, $200,000; School No. 2, $150,000; School No. 3, $150,000; School No. 4, $150,000; School No. 5, $150,000. Bond election planned.

Tex., San Augustine—City, hospital. $150,000. Bond election soon.

★**Tex., Texas City**—Independent School Dist., high school, $300,000; school $200,000; school $150,000. Will vote bonds.

Tex., Van—Public School Bd. plans school $150,000. Financing not provided.

Alaska, Fairbanks—University of Alaska, Fairbanks, plans agricultural experiment station, $50,000; completing Elelson Bldg. $60,000; School of Mines, $80,000; campus residences, $33,000.

★**N. B., Fredericton**—Dpt. P. Wks., Fredericton, departmental bldg., St. John St. between King and Queen Sts. $1,000,000.

N. S., Antigonish—Municipality, H. R. Chisholm, clk., City Hall, municipal bldg., housing all civic departments, committees, etc. $150,000.

N. S., Antigonish—Municipality, H. R. Chisholm, clk., housing program, $150,000.

Ont., Brantford—City, Recreation Projects Postwar Planning Comm., E. M. Prichard, chn., about 180x300 ft. brick or stone recreation bldg. and community centre. $375,000.

Ont., Leamington—Town, F. R. Gregory, chn. Bldg. Com., hospital, $150,000 plus. CD 7/30/43—ENR 8/5/43.

Ont., Oakville—School Trustees, vocational school. $250,000.

Ont., Ottawa—Ministry of Educ., Province of Ottawa, Queens Park, Toronto, high school. $400,000.

Ont., Ottawa—Municipality, hospital for incurables, Porter's Island. $200,000.

★**Ont., Peterboro**—City, City Hall, civic hospital, $600,000.

Ont., Stratford—City, hospital and clinical laboratory. $350,000. CD 7/1/43—ENR 7/8/43.

Ont., Toronto—Municipality, housing, Gerrard-Parliament District. $300,000.

★**Ont., Toronto**—Municipality and Provincial Government, Ottawa, court house. $500,000.

Ont., Toronto — Municipality, remodeling city hall. $250,000.

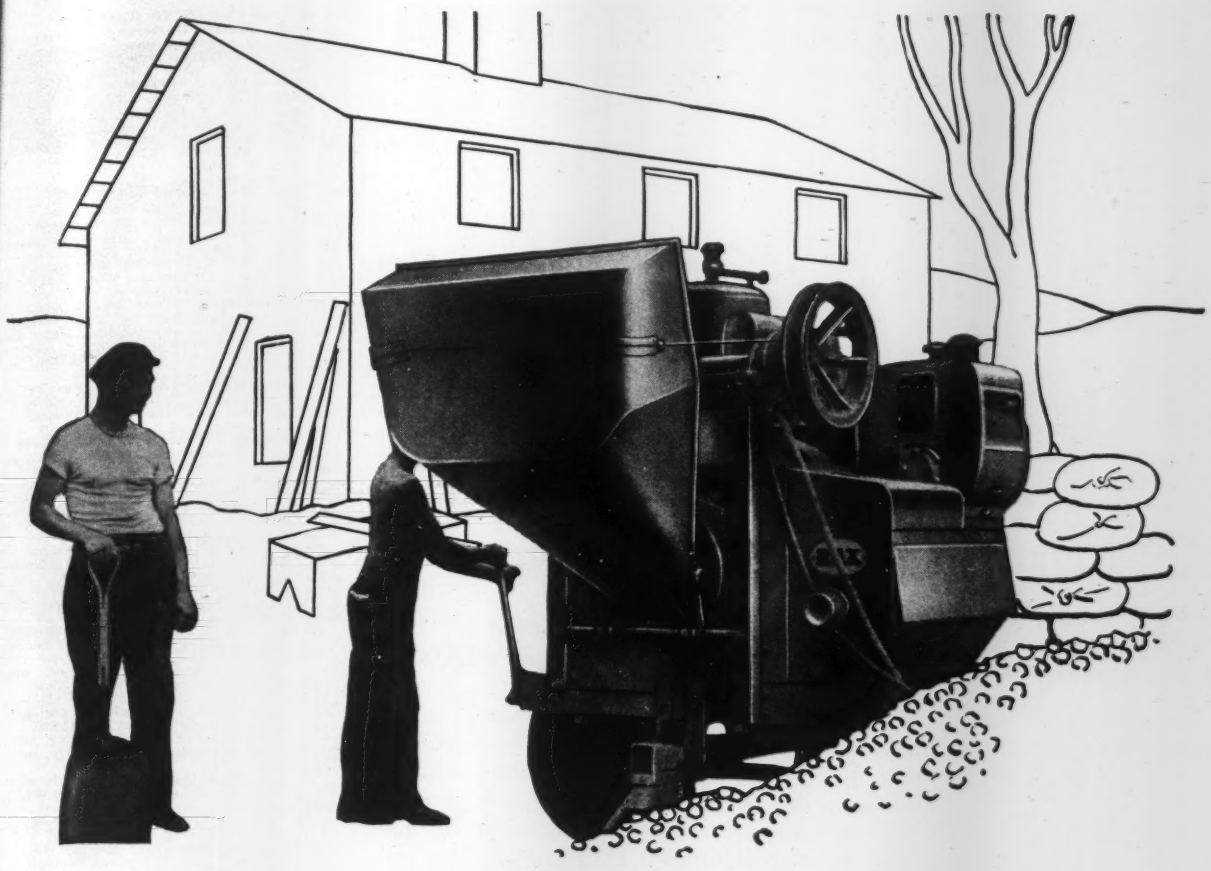
★**Que., Hull**—Municipality, 350 bed hospital. $600,000.

Que., St. Joseph d' Alma—Citizens Committee, Town Hall, plans community center, incl. swimming pool, etc. $200,000.

PLANS UNDER WAY

Calif., Santa Monica—Bd. Educ., plans by J. M. Estep, 236 24 St., Grant School addn. $150,000.

Conn., Storrs—University of Connecticut, Storrs, plans by Frederick C. Teich, 3[illegible] Golf St., Newington, Ratcliffe Hicks School and Dormitory. $400,000. Financing available. CD 6/14/43—ENR 6/17/43.



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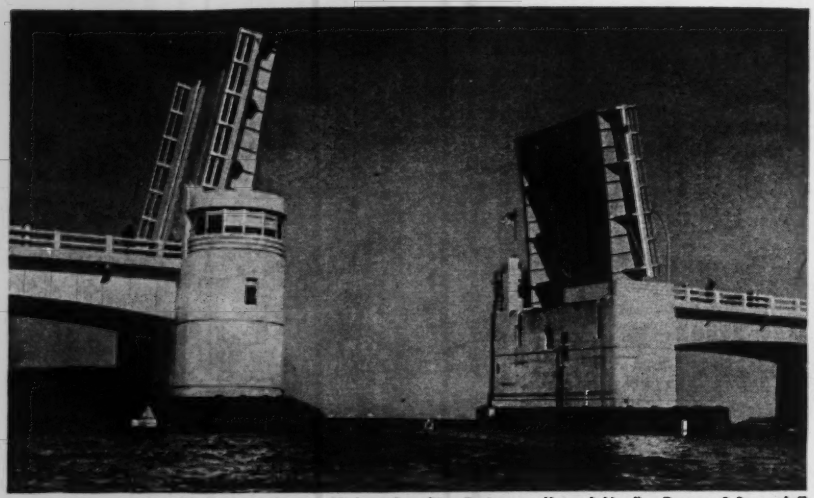

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POSTWAR PROJECTS (Cont'd.)

★**Conn., Storrs**—University of Connecticut, A. N. Jorgensen, pres., plans by F. C. Teich, 37 Golf St., Newington, laboratory and classroom unit, **$300,000**; agricultural industries bldg., **$490,000**. Financing not provided. CD 3/18/43—ENR 3/25/43.

Idaho, Twin Falls—City, plans 5% completed by Paradice & Lash, Dietrich Bldg., Pocatello, city hall and auditorium. Site acquired. **$250,000**. Will vote bonds. J. H. Hayes, city engr.

La., Franklin—St. Mary Parish School Bd., 5th Ward Special School Dist. 1, plans by Favrot & Reed, Nola Bldg., New Orleans, school. **$150,000**. Plan to vote bonds soon.

★**La., Jackson**—Bd. Directors Louisiana State Hospital, Baton Rouge, plans 1% completed by E. F. Neild, City Bank Bldg., Shreveport, 4 hospital bldgs. **$1,010,000**. Financing not provided.

La., Leesville—Vernon Parish School Bd., plans 10% completed by M. G. Heinberg, Commercial Bldg., Alexandria, school **$150,000**; school **$200,000**. Financing not provided. CD 5/17—ENR 5/25, under Public Bldgs.

Mass., Amesbury—Town, Bd. Trustees Amesbury Hospital plans completed by Kendall Taylor & Co., Inc., 221 Columbus Ave., Boston, nurses' home, at Amesbury Hospital. **$150,000**. Financing not provided.

Mass., Amesbury—Town, School Dpt., Town Hall, plans by S. W. Haynes & Associates, 336 Main St., Fitchburg, concrete, brick, high school addn., Main St., to exceed **$150,000**; 2 story, bsmnt. school, School St., to exceed **$150,000**. Financing not provided. CD 8/20—ENR 8/26.

Mass., Braintree—Town, H. Higgins, chn., Town Hall, plans completed by Shepard & Stearns, 65 Franklin St., Boston, 3 story, 84x110 ft., brick, steel high school addn. **$250,000**. Financing not provided. CD 11/4—ENR 11/11.

Mass., Fall River—City, City Hall, plans 50% completed by Thomas J. Logan, comr. P. Wks., City Hall, 1 story, 80x120 ft. garage, 1 story, 27x120 ft. shops, etc. **$80,000**. Financing not provided.

★**Mass., Fall River**—City, City Hall, 1 story, bsmnt., 100x250 ft., brick, steel veterans memorial bldg., **$540,000**. Land rights not cleared and financing not provided. T. J. Logan, City Hall, comr. P. Wks.

Mass., Franklin—Town, Supt. Schools, Town Hall, preliminary sketches by H. E. Mason, 15 Prospect St., Leominster, concrete, brick, school, Mason and West Sts. Over **$150,000**. Financing not provided.

Mass., Medfield—Dpt. Mental Health, 100 Nashua St., Boston, plans completed by Andrew Jones Biscoe & Whitmore, 50 Congress St., Boston, hospital for disturbed males, Medfield State Hospital. **$250,000**. Financing not provided. Lionel G. Gale, 120 Tremont St., Boston, Mass., electrical engr. Hubbard, Rickerd & Blakeley, 110 State St., Boston, engrs.

Mich., Detroit—Detroit Dpt. Police, Clinton and Beaubien St., plans 5% completed by G. R. Thompson, city engr., brick, steel, stone, rein.-con. police stations for 2nd and 13th Precincts. **$305,000**. Snyder & McLean, 2214 Penobscot Bldg., consult engrs. CD 3/30—ENR 4/1.

Mich., Northville—Dpt. P. Health, 3918 John R. St., plans by G. R. Thompson, city engr., clinic bldg. at Maybury Sanitarium. **$301,785**.

Minn., International Falls—Bd. Educ., H. H. Irig, clk., plans by A. R. Melander, 603 Alworth Bldg., Duluth, 2 story, 92x214 ft. Senior High School. **$175,000** bonds voted. CD 11/30—ENR 12/14.

Minn., Zumbrota—Bd. Educ., G. G. Erridge, clk., plans by E. D. Corwin, 813 Guardian Bldg., St. Paul, school. To exceed **$200,000**. Will vote bonds. CD 6/7—ENR 6/15.

★**N. H., Portsmouth**—City, H. L. Moore, supt. Schools, 120 Daniels St., Portsmouth, plans completed by Alfred Granger Associates, 341 Main St., Hanover, brick, steel high school. **$1,200,000**. Financing not provided. C. A. Maguire, 1515 Turks Head Bldg., Providence, R. I., consult. engr. CD 3/27—ENR 4/6.

N. J., Cape May Court House—Bd. Freeholders Cape May Co., Court House, plans under way by State Dpt. Institutions & Agencies, Trenton, county hospital and almshouse. **$150,000**. Financing not provided.

New York—Dpt. P. Wks., Municipal Bldg., New York, plans by R. Irrera, 3206 Steinway St., Astoria, Queens Village Branch Library, 217 St. between 94 Ave. and 94 Rd., **$109,000**; plans by S. L. Strauss, Grand Central Terminal Bldg., New York, Jackson Heights Branch Library, 81 St. and 37 Ave., Project L-36, **$109,000**; plans by S. A. Hertz, 103 Park Ave., New York, Zone 17, Elmhurst Regional Branch Library addn., Project L-74, Richmond Hill Regional Branch Library addn., Project L-75, and Far Rockaway Regional Branch Library addn., Project L-77, **$63,600**, all for Queens Boro Pub. Library. Financing not provided. CD 1/21—ENR 2/10.

★**N. Y., Brooklyn**—Bd. Educ., 49 Flatbush Ave. Exten., plans by G. A. Boehm, 2 W. 45 St., New York, Zone 19, P.S. 32, Project E-135, Hoyt and President Sts. **$785,000**. CD 1/21—ENR 2/10.

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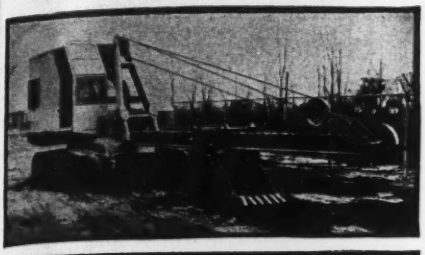

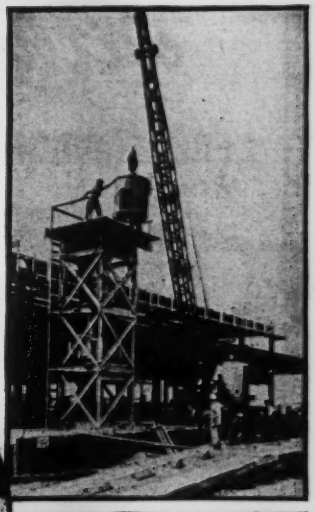

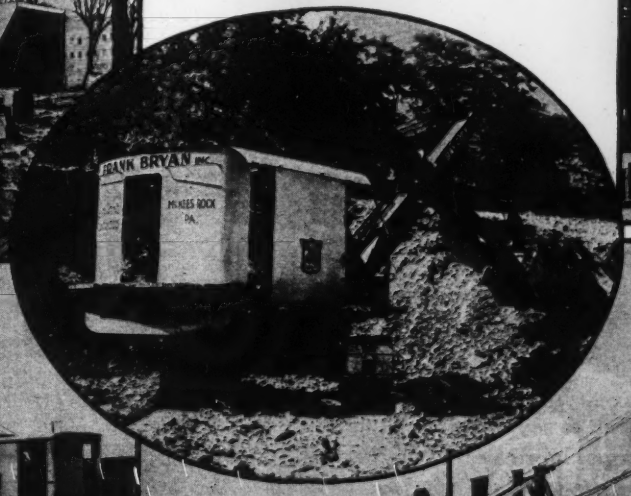

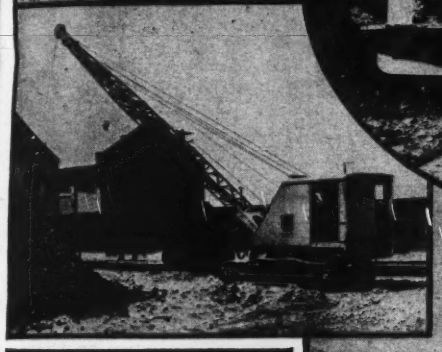

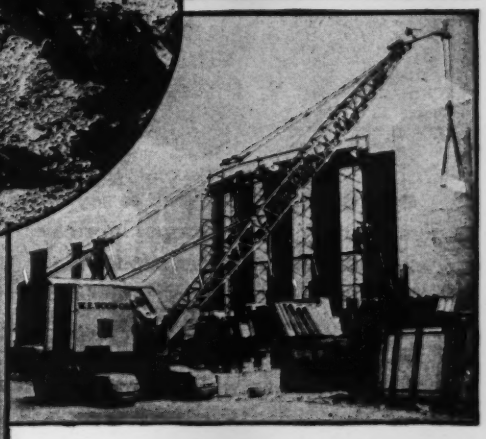

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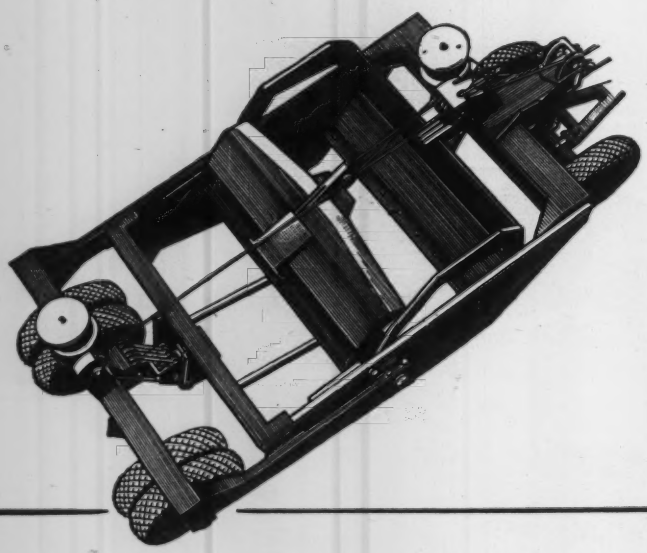

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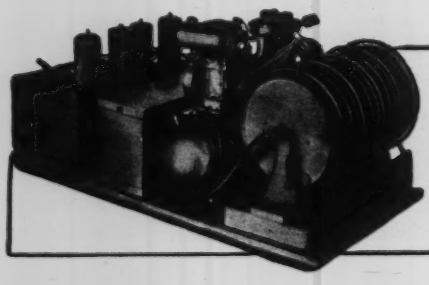

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POSTWAR PROJECTS (Cont'd.)

N. Y., Brooklyn—Dpt. P. Wks., Municipal Bldg., New York 7, plans completed by G. A. Boehm, 2 W. 45 St., New York, Zone 19, altering nursing training facilities at Greenport Hospital, for Dpt. Hospitals, 125 Worth St., New York, Zone 13. $186,200. Financing not provided. CD 11/3—ENR 12/14.

N. Y., Long Island City—Dpt. P. Wks., I. V. A. Huie, comr., Municipal Bldg., New York, Zone 7, plans under way stanchion re-pair shop, for Police Dpt., 240 Centre St., New York. $112,000. R. H. Gould, Dir. Div. Engrg.

N. Y., Long Island City—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, plans by F. P. Pratt & Bro., 101 Park Ave., New York, Zone 17, garage addns., Dists. 56 and 68, for Dpt. Sanitation, 125 Worth St., New York. $143,000.

N. Y., Old Clifton (mail Staten Island)—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, plans by I. Fenichel, 724 5 Ave., New York, Zone 19, garage for Dists. 76, 77 and 78, and section station for Dpt. Sanitation, 125 Worth St., New York. $357,000.

N. Y., Olean—Bd. Educ., Olean, $142,000 bond election Jan. 24, brick, steel, concrete addn. School 7, North End. $190,000.

N. Y., St. Albans—Dpt. P. Wks., I. V. A. Huie, comr., Municipal Bldg., New York, Zone 7, plans by S. Strauss, 70 E. 45 St., New York, Zone 17, precinct house, for Police Dpt., 240 Centre St., New York. $191,000.

N. Y., Silver Lake (mail Staten Island)—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, plans under way Richmond Central Fire Alarm Station, for Fire Dpt., 1123 Municipal Bldg., New York, Zone 7. $129,000. R. H. Gould, Div. Dir. Engr.

O., Warrensville Heights (br. Cleveland)—Bd. Educ., R. Fisher, clk., sketches by H. A. Fulton, 6014 Euclid Ave., Cleveland, brick, steel school. $250,000. 2 mill levy approved.

Ore., Portland—Multnomah Co., Court House, plans 25% completed remodeling court house, $300,000; remodeling hospital, $150,000. G. W. Buck, Court House, engr.

Ore., Salem—State, Salem, plans completed truck repair shop, storage warehouse, remodeling Cell Block A, constructing new cell block, bath house. $236,900. Financing not provided.

★**Pa., Harrisburg**—Dauphin Co., plans by Lawrie & Green, 321 N. Front St., detention home $200,000; jail $200,000; hospital at County Home $200,000.

Tex., Highland Park (Dallas)—Independent School Dist., 3510 Normandy St., Dallas, plans 25% completed by M. Lemmon, Tower Petroleum Bldg., Dallas, Senior High School addn. $150,000, Junior High School addn. $150,000. Financing not provided; school $250,000. Financing 25% provided. CD 11/15—ENR 11/30.

★**Tex., Houston**—Harris County Navigation Dist., Court House, plans 1% completed passenger and freight terminal, at Wharf 2, incl. dredging, etc. $1,250,000. Funds available. R. J. Cummins, Bankers Mtg. Bldg., consult. engr.

★**Tex., Odessa**—Bd. Educ., Odessa, plans by Haynes & Strange, 415 Myrick Bldg., Lubbock, school $150,000; school $150,000; high school $250,000. Bonds voted.

★**Tex., San Antonio**—Bd. Educ., Lavaca and Water Sts., plans by Phelps & De-Wees & Simmons, Majestic Bldg., impvt. brick, concrete Junior High Schools. $500,000. Will vote bonds.

Tex., San Antonio—Witt Memorial Museum, Breckenridge Park, San Antonio, plans by B. Cocke, Milam Bldg., H. Stembomer, Travis Bldg., J. F. Buenz, 618 Paschal St., memorial hall, founders hall, exhibit and auditorium, production bldg., workshop. To exceed $150,000.

Wash., Longview—School Bd. plans by Wolff & Phillips, Pearson-4th Ave. Bldg., Portland, Ore., 2 schools. $185,000 each. Bonds voted. CD 11/22.

Ont., Oshawa—Bd. Educ., 137 Clark St., plans by J. B. Parkin, 96 W. Bloor St., Toronto, school. $175,000. CD 5/10—ENR 5/18.

★**Ont., Toronto**—City, F. J. Conboy, mayor, plans by Beck & Eadie, 220 Bloor St. W., library, Yonge St. and Lawrence Ave. $700,000-$900,000.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ind., Elkhart—Mennonite Church, Goshen, hospital. $150,000.

Mass., Lowell—St. Casimir's Polish National Church, Lakeview Ave., concrete, brick, stone church. To exceed $150,000. Raising funds.

Mich., Flint—St. Joseph Hospital, Flint, nurses' home and training school. $450,000.

N. Y., Jamestown—Bd. Trustees First Methodist Church, D. N. Fleek, chn., E. 2 St., brick, stone, church, Sunday school, 8 St. and Lakeview Ave. $250,000. Site acquired.

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Opening of TECO Wood Products Development Shop

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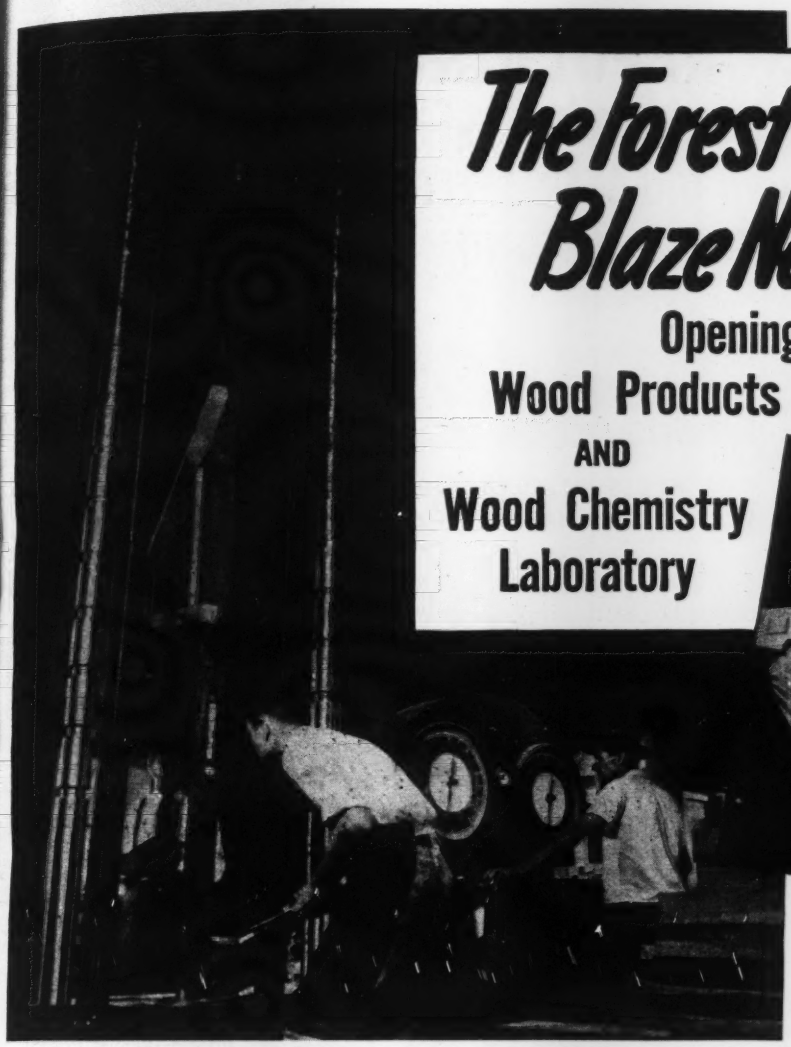

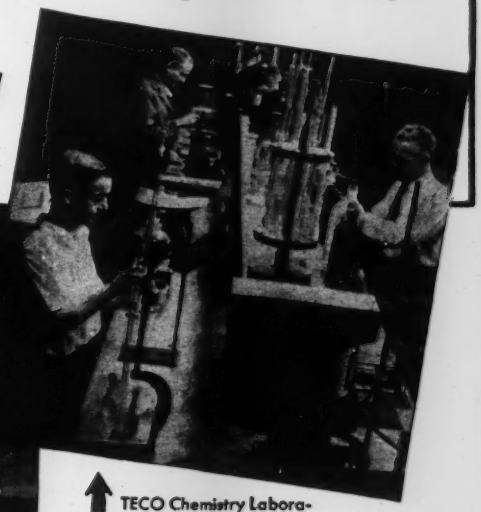

TECO Chemistry Laboratory. TECO chemists are here shown working on lignin derivatives.

200,000 lb. Baldwin-Southwark testing machine in the TECO Shop. Material undergoing test is a small wood column being tested in compression.

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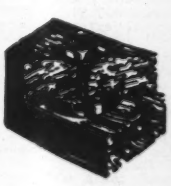

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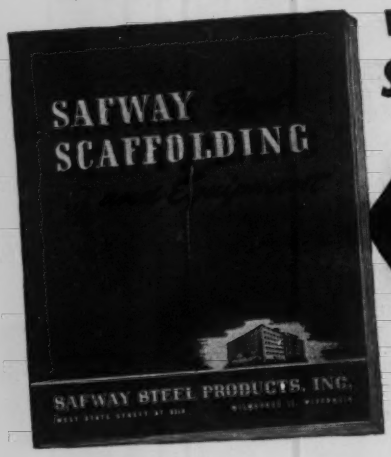

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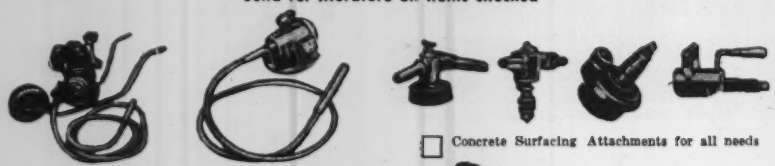

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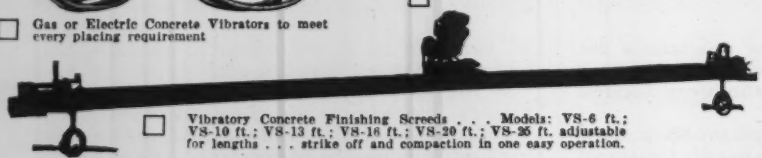

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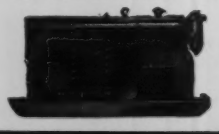

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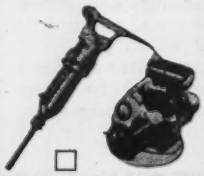

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POSTWAR PROJECTS (Cont'd.)

★**O., Cleveland**—M. Gillen, 3444 Milverton Rd., 150+frame, brick houses. $1,125,000. Financing available.

Ore., Portland—Cascade College, 5624 N. Borthwick St., chapel and administration bldg., girls dormitory, music bldg. and gymnasium. $250,000.

★**R. I., North Providence**—R. Antonelli, 373 Webster Ave., Providence, residential development, Homewood, Oakridge, Belcourt and Olney Aves. $500,000. Financing not provided.

R. I., Pawtucket—Memorial Hospital, Prospect St., brick, steel hospital. To exceed $150,000. Financing not provided.

Ont., Galt—C. Bickle, 47 Portland St., plans dwellings. $150,000.

Ont., Galt—C. Lundy, 17 North St., 1½ story brick, concrete dwellings. $150,000.

N. B., Campbellton—F. G. Spencer Co., Ltd., Saint John, plans theatre. $150,000.

Newfoundland, St. John's—Memorial University College Bd., St. John's university bldgs. $200,000.

Ont., Toronto—Bank of Montreal, St. James St., Motreal, Que., completing bank. $200,000.

P. E. I., Charlottetown—F. G. Spencer, St. John, plans theatre. $150,000.

Que., Westmount — Protestant School Comn., F. O. Whittell, secy., Westmont Ave., high School. $300,000.

PLANS UNDER WAY

Fla., Jacksonville Beach—Jax Beach Hotel Corp., Jacksonville Beach, plans 90% completed by R. Olson, engr. and archt., c/o Twentieth Century Designers, 1530 Hendricks Ave., Jacksonville, hotel, 1st St. $400,000. Funds available.

★**Idaho, Boise**—Hotel Boise, 8 and Bannock Sts., plans by McClelland & Jones, Republic Bldg., Seattle 1, Wash., 5 story hotel addn., air conditioning. $600,000. CD 12/28.

Ill., Jacksonville — MacMurray College, Jacksonville, plans by H. Smith, c/o Smith, Kratz & Strong, 101 S. Bway., Urbana, and O. C. Poundstone, Palmer Bldg., Atlanta, Ga., brick chapel. $200,000. CD 10/7—ENR 11/16.

Ill., Jacksonville — Passavant Memorial Hospital Assn., E. State St., plans 75% completed by Edgar Martin, 540 N. Michigan Ave., Chicago, 3 or 4 story, brick hospital addn. $300,000. Funds not provided.

★**Kan., Atchison**—St. Benedict's College, Rt. Rev. C. McDonald, pres., plans by J. B. Shaughnessy, Reliance Bldg., Kansas City, student residence hall, chapel, library and science bldg. $1,000,000.

La., Baton Rouge—St. Joseph's Convent, 321 N. 4 St., plans by Bodman & Murrell, Reymond Bldg., administration bldg., auditorium-gymnasium bldg., incl. swimming pool, Broussard and Kleinert Ave.

La., Bossier—Bossier State Bank, Bossier, plans by J. Chesshire Peyton, 735 Slattery Bldg., Shreveport, bank. $150,000.

La., New Orleans—Baptist Hospital, 2700 Napoleon Ave. and Magnolia St., plans 25% completed by Favrot & Reed, Nola Bldg., hospital wing and nurses' home. $275,000. Financing available. CD 7/12—ENR 5/18, under Commercial Bldgs.

La., New Orleans—Catholic Diocese of New Orleans, c/o Diboll-Kessels & Assoc., archts., Baronne Bldg., making plans bldgs. San Salvador Institute, on 50 acre tract, Bayou Barataria, 11 mi. from here. $300,000.

La., New Orleans—Catholic Diocese of New Orleans, c/o Wogan & Bernard, archts., Baronne Bldg., making plans Jesuit High School addn. $250,000.

★**Md., Garrett Park**—Diplomat Hotel, c/o H. L. Rust Co., 1001 15 St. N.W., Wash., D. C., plans by Frank Grad & Sons, 1642 Connecticut Ave. N.W., Wash., D. C. hotel, on 116 acre site. $20,000,000.

Mass., Fitchburg—Y. M. C. A., W. S. Brown, pres., 42 Dudley St., plans by Natl. Y. M. C. A. Bldg. Bd., 347 Madison Ave., New York, brick, steel, Y. M. C. A. unit, incl. swimming pool, etc. $300,000.

Mo., St. Louis—Fanchon & Marco Service Corp., c/o H. C. Arthur, pres. and genl. mgr., Fox Theatre Bldg., 527 N. Grand Blvd., St. Louis 3, plans by J. & D. Eberson, 2 W. 47 St., New York, 2 motion picture theatres. Est. $150,000 each.

N. J., Elizabeth — Westminster Presbyterian Church, 575 Westminster Ave., sketches by C. G. Poggi, 287 Morris Ave., church. $163,000.

N. C., Morgantown—Grace Hospital, S. K. Hunt, administrator, plans by Y. W. Breeze, Shelby, 4 story, hospital exten., 2 wings. $250,000.

O., Cleveland—Future Outlook League, Inc., J. O. Holly, pres., Woodland Market Bldg., plans by G. A. Ebeling, Cuyahoga Bldg., community center. $150,000. Land rights not cleared and financing not provided.

★**R. I., Westerly**—Westerly Hospital, H. C. Perry, Wells St., plans completed by Kendall Taylor & Co., Inc., 221 Columbus Ave., Boston, Mass., main ward addn.

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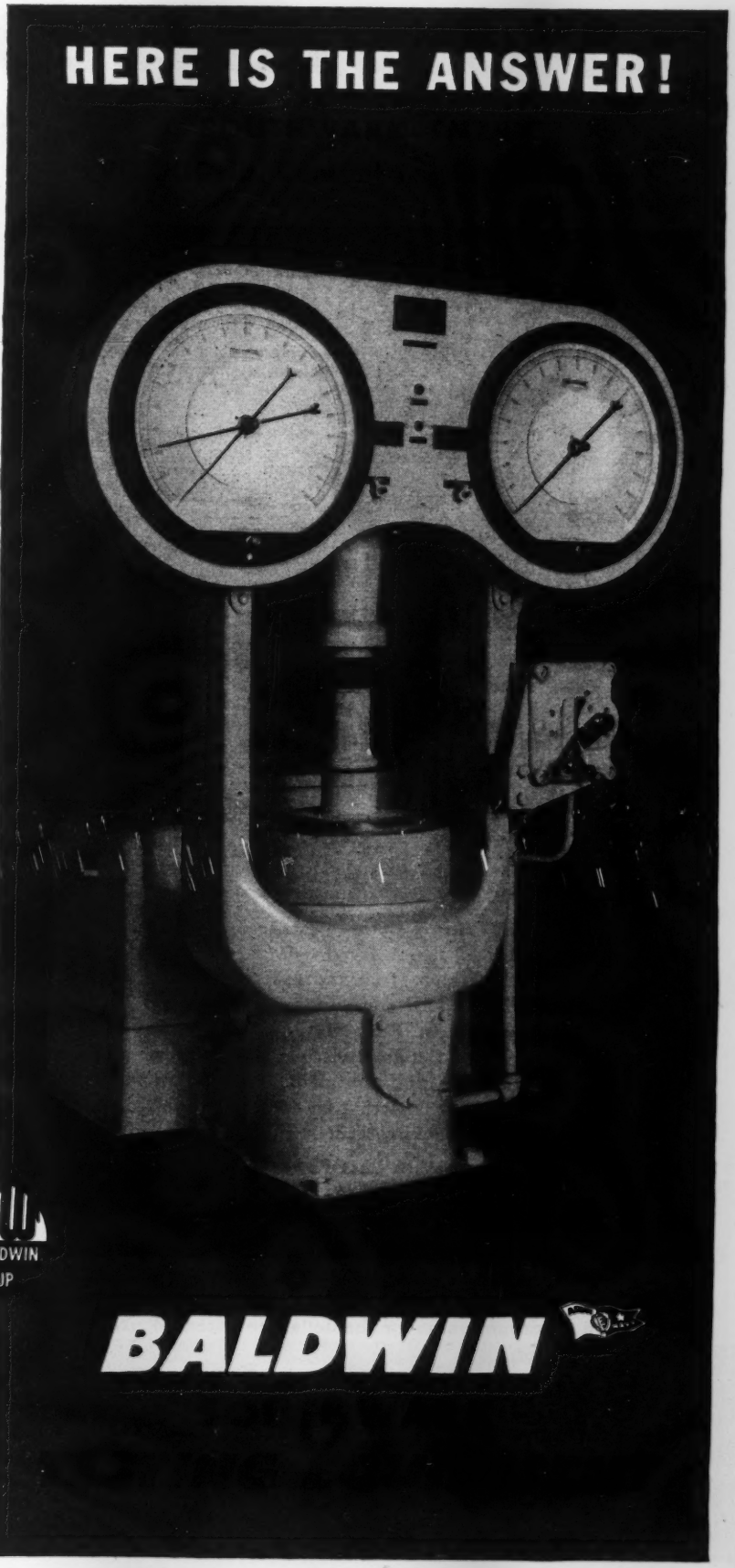
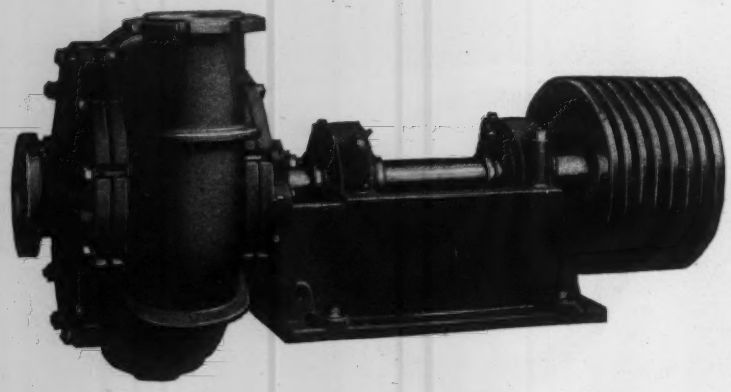


DEMONSTRATED

"Life Expectancy" Makes Satisfied Users



MORRIS

Centrifugal MATERIAL-HANDLING PUMPS

It's as difficult to put your finger on the exact reasons for exceptional "life expectancy" in a pump as it is in a man. But basically the fundamental structure must be sound . . . and well-adapted to the environment. Over-strain must be avoided.

That's why Morris pumps feature larger shafts, larger and better-sealed bearings, more ample stuffing boxes, and heavier cast sections. To avoid excessive strain, wear and vibration, Morris pumps are designed to give top efficiency at moderate speeds. Flow through the pump—even of heavy slurries and highly viscous fluids—is smooth and constant, assuring uniform loading of the impeller and balanced radial forces acting on the shaft. Shaft deflection is negligible and packing wear is substantially reduced.

More Output With Less Power and Maintenance

Owners are usually amazed at the sustained efficiency, and at the lower power, labor and maintenance costs when figured on a year-in, year-out basis. The accurate dynamic balance of all rotating parts—the smooth, vibration-free operation—and the outstanding wearability of all parts—give maximum value for the dollars invested. *Write today for Bulletin.*

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Branch Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

POSTWAR PROJECTS (Cont'd.)

men's employees unit, tunnel between nurses' home and hospital. $500,000. Financing not provided. 12/28.

★**Tex., San Antonio**—Trinity University, 3115 W. Ashby St., plans 2½ completed by H. P. Smith, Natl. Bank Bldg. and Bartlett Cocke, Milam Bldg., room bldg. **$450,000**; dormitory for wom **$350,000**; dormitory for men, $350,000; ministration bldg., **$450,000**; **$150,000** each; gymnasium, etc., **$50,000** steam heating plant, **$75,000**; draining pus, **$45,000**; site development, $50,000; system, **$100,000**; sanitary sewerage sys **$75,000**, all on newly purchased 105 acre site CD 5/26/43 and 1/13/44—ENR 6/17/43 and 1/27/44.

N. B., Moncton—Famous Players Canadian Corp., Ltd., Royal Bank Bldg., Toronto, Ont., plans by Kaplan & Sprachman, 30 Dundas St. W., Toronto, Ont., theatre **$155,000.**

N. S., Halifax—Famous Players Canadian Corp., Ltd., Royal Bank Bldg., Toronto, Ont., plans by Kaplan & Sprachman, 30 Dundas St. W., Toronto, Ont., theatre **$160,000.**

READY FOR BIDS

N. Y., New York—Briggsford Corp., 201 Sherman Ave., New York 56, plans completed by A. B. Bates, 2526 Webster Ave., New York, Zone 58, 6 story, 90x110 ft. apartment, 240 St. and Katonah Ave., $225,000; 6 story, 50x85 ft. apartment Briggs Ave. near 199 St. **$100,000**; 6 story apartment, Bainbridge Ave. and 199 St. **$110,000.**

★**N. Y., New York**—Cornet Leasing Corp., M. E. Kulukindis, pres., 57 W. 58 St., plans completed by H. I. Feldman, 415 Lexington Ave., New York, Zone 17, 13 story apartment, 559-563 Madison Ave. **$550,000.**

N. Y., New York—Ann Gursky, Larchmont, plans completed by M. Glick, 400 E. Fordham Rd., New York, Zone 58, 6 story, 54x187 ft. apartment, Perry Ave. and 201 St. **$300,000.**

★**N. Y., New York**—Holkl Holding Corp., J. A. Cosmetto, pres., 57 W. 58 St., New York, Zone 19, plans completed by H. F. Feldman, 415 Lexington Ave., 16 story apartment, 142-26 6 Ave. **$1,000,000.**

N. Y., New York—Jaysum Building Corp., S. Summers, pres., 1765 Canton Ave., New York 57, plans completed by H. Ginsberg, 205 E. 42 St., New York 17, 6 story apartment, 1247-1257 Morris Ave. **$300,000.**

N. Y., New York—Kings College Place Corp., 2685 University Ave., New York, Zone 63, plans completed by H. J. Feldman, 415 Lexington Ave., New York, Zone 17, 6 story, 100x150 ft. apartment, 211 St. and Kings College Pl. **$300,000.**

★**N. Y., New York**—A. LaSala, 118 E. 28 St., New York 16, plans completed by S. J. Kessler & Sons, 18 E. 28 St., New York 16, 6 story apartment, Webster Ave. and 236 St., **$300,000**; 6 story apartment, Rochambeau Ave. and 208 St., **$125,700**; 6 story apartment, Rochambeau Ave. and 206 St. **$113,700.**

N. Y., New York—Normark Realty Corp., M. Kavenaff, pres., 154 Nassau St., New York 7, plans completed by M. Wechsler, 103 Park Ave., New York 17, 6 story apartment, 71-75 W. 96 St. **$150,000.**

N. Y., New York—Shafecrans Realty Corp., 112 Central Park S., New York 19, plans completed by A. Goldhammer, 6 Varick St., New York 13, 6 story, 85x100 ft. apartment, Webster Ave. and 188 St. **$320,000.**

N. Y., New York—Termel Realty Corp., 565 5 Ave., plans completed by Schlenger & Sornik, 595 Madison Ave., New York, Zone 22, 2 story motion picture theatre and stores, 1187-97 6 Ave. **$300,000.**

★**N. Y., New York**—Woodward Associates, Hotel Woodward, New York 19, plans completed by H. I. Feldman, 415 Lexington Ave., New York, Zone 17, 25 story apartment, 200 W. 55 St. **$1,750,000.**

CONTRACTS AWARDED

★**N. Y., New York**—Best & Co., 5 Ave. and 35 St., 12 story, penthouse store, 5 Ave. and 51 St., to John Lowry, Inc., 52 Vanderbilt Ave., New York 17. **$2,940,000.** CD 8/24—ENR 9/7.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Mass., Lynn—FACTORY—Antiseptic Mattress Co., 35 Wyman St., brick, steel factory addn. **$40,000.** Financing not provided.

Mo., St. Louis—PLANT—Arel Photo Supply Co., 918 Delmar Blvd., St. Louis 1, impry., group 1 story bldgs., 1909-11 S. Kingshighway Blvd.

Mo., St. Louis—WAREHOUSE, etc.—Thomas J. Sheehan Co., 2233 Olive St., St. Louis 3, warehouse and office, Skinker Blvd. and Maple Ave. Site purchased.

Mo., St. Louis—PLANT—Utility Homes Co., Kingshighway and Fyler Ave., St. Louis 9, rein.-con. plant. To exceed **$40,000** with equip.

Another MARION Achievement

A CRANE THAT HAS EVERYTHING!

MARION DISTRIBUTORS

ACCURACY in spotting loads.

SMOOTH acceleration.

STABILITY with long reach.

MANEUVERABILITY in close quarters.

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READILY CONVERTIBLE to dragline or clamshell service.

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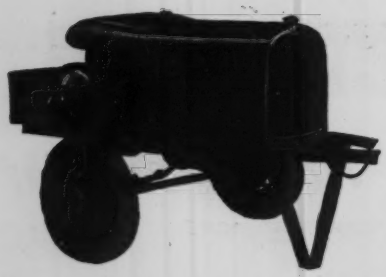
COAL LOADERS • STRIPPING SHOVELS • GAS • DIESEL • ELECTRIC (From ¾ cu. yd. to 35 cu. yds.)



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Here's your compressor for a majority of work. It's big enough—powerful enough to "take it" year after year. Yet, it's easy to move from one job to another and inexpensive to operate. Uses only 1 gal. of gasoline an hour. Made with FORD MOTORS and standard parts. Automatic unloading and idling; self-starter. Won't you write for complete information?

With a Ford Motor and Shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

GORDON Smith & CO. Incorporated

430 College St., Bowling Green, Ky.

POSTWAR PROJECTS (Cont'd.)

Mo., St. Louis—SERVICE STATION, GARAGE, etc.—Winters Motor Car Co., J. F. Winters, pres., 3641 South Kingshighway, St. Louis 9, 2 story, bsmnt., 120x145 ft., brick, concrete, terra cotta garage and service bldg., Kingshighway and Fyler Ave. To exceed **$40,000.** Site purchased.

Mont., Billings—WAREHOUSE—Marshall-Wells Co., 1420 N.W. Lovejoy St., Portland, Ore., 3 story warehouse, N. 22 St. and 1 Ave. To exceed **$40,000.**

★**N. Y., Yonkers**—LABORATORY—Celanese Corp. of America, 180 Madison Ave., New York, Zone 16, experimental and research laboratory, Central Park Ave., 22 acre site. **$1,000,000.**

N. C., Old Fort—DYEING and FINISHING PLANT—Clearwater Mfg. Co., J. H. Hough, vice pres., Clearwater, dyeing and finishing plant. To exceed **$40,000.** Site acquired .

O., Cleveland—FACTORY—Baker Raulang Co., E. J. Bartlett, pres., 2168 W. 25 St., 1 and 2 story, brick, steel factory addn. **$100,000.** Financing available.

Pa., Phila.—PLANT—H. Brinton Co., 3700 Kensington Ave., plant, Kensington Ave. and N St. **$350,000.** Financing provided. CD 12/18—ENR 12/28.

★**Pa., Warren**—GENERATING PLANT—Pennsylvania Electric Co., P. J. Harris, pres., Johnstown, Pa., 30,000 kw. generating plant, on 100 acre site. **$4,000,000.**

R. I., Woonsocket—GARAGE and SALES—Le Claire & Tetreault, 1 Magellan St., Providence, brick, steel service garage and auto sales bldg. **$50,000.**

Tex., San Antonio—PLANT—Calavo, Inc., 333 N. Medina St., refrigeration plant. **$40,000.** CD 3/15—ENR 3/23, under Industrial.

Wash., Seattle — WAREHOUSE — Adams News Co., 309 Wall St., 2 or 3 story, 120x180 ft., rein.-con. warehouse, Boren Ave. N. and Mercer St. To exceed **$40,000.**

B. C., Ashcroft—MINE DEVELOPMENT—St. Eugene Mining Corp., c/o Ventures, Ltd., 25 W. King St., Toronto, Ont., black lignite coal mines development and essential dwellings, near here. **$90,000.**

Ont., Leaside—PLANT—S. K. Wellman Co., 1374 E. 51 St., Cleveland, O., plant. **$50,000.**

Ont., Toronto—PLANT—Briggs Clarified Co. of Canada, Ltd., c/o Briggs Clarifier Co., Inc., 1339 W. Wisconsin Ave. N.W., Wash., D. C., oil filter manufacturing plant. **$50,000.**

Ont., Toronto—FACTORY—Canada Steel Strapping Co., Ltd., 103 Bathurst St., factory. **$50,000.**

Ont., Toronto—PLANT—Dayton Rubber Co. Canada, Ltd., 3723 Dundas St., plant addn. **$75,000.**

Que., Marieville — PLANT — Marieville Paper Box Co., Marieville, plans plant exten. **$40,000.**

Que., Quebec City — BOTTLING PLANT, etc.—Coca Cola Co. of Canada, Ltd., 90 Broadview Ave., Toronto, Ont., bottling plant and warehouse, 1st Ave. **$200,000.**

PLANS UNDER WAY

Conn., Bridgeport — GARAGE — McLean Trucking Co., Inc., 350 Cherry St., plans by Fletcher Thompson, Inc., engr.-archt., 211 State St., 1 story, 25x250 ft., and two wings, 45x70 and 45x55 ft., brick, concrete block truck garage. **$45,000.**

Ill., Jacksonville—POWER PLANT—Illinois College, plans by D. B. Hull, 77 W. Washington St., Chicago, power plant. **$40,000.**

Ky., Louisville—NEWSPAPER PLANT—Courier-Journal and Louisville Times, 300 West Liberty St., plans by Lockwood-Greene Engineers, Inc., 20 Rockefeller Plaza, New York, N. Y., newspaper plant, radio station WHAS, administration bldg., rotogravure plant. CD 8/10—ENR 8/24, under Unclassified.

Md., Baltimore — WAREHOUSES — Hecht Bros. Co., Baltimore and Pine Sts., Zone 1, plans by Abbott Merkt & Co., 10 E. 40 St., New York, N. Y., altering warehouses. **$220,000.**

N. Y., New York — WAREHOUSE — A. Sancillo, c/o Jacowitz & Goldman, 276 5 Ave., New York 1, plans completed by S. L. Strauss, 70 E. 45 St., New York 17, 1 story, 63x115 ft. warehouse, 436-440 W. 31 St. **$40,000.**

R. I., Providence—WAREHOUSE and FACTORY—E. Rosen Co., 296 Charles St., plans by Barker & Turoff, 1022 Grosvenor Bldg., brick, steel warehouse and factory.

Tex., Alice—SHOP and WAREHOUSE—W. J. Sames, Jr., Laredo, plans 25% completed by A. B. and R. M. Ayres, Transit Tower, San Antonio, 160x160 ft. shop and warehouse. **$60,000.**

Tex., San Angelo—REPAIR SHOP, etc.—Westbrook Motor Co., San Angelo, plans 50% completed by Howe & Wise, 610 Stewart St., Houston, 1 story, 130x130 ft. repair shop and storage. **$50,000.** Financing available.

Tex., San Antonio — WAREHOUSE and PLANT—Carpenter Paper Co., 619 W. Commerce St., plans 25% completed by A. B. and R. M. Ayres, Transit Tower Bldg., 1 story, bsmnt. warehouse and plant. **$100,000.** CD 5/9—ENR 5/18.

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THE gripping unit in an Electroline-Fiege Wire Rope Connector holds like a Bulldog because it has a "Positive Grip". The holding compression is graduated from front to rear so that danger of crystallization, due to vibrations, is eliminated. Frayed strands and early failures are avoided.

Many other advantages, such as greatly increased wire rope life, elimination of hazards to workmen, etc., have made these connectors first choice for dependable results. Let us send you an interesting booklet, "Positive Grip". It will give you complete performance data on this easily installed, better and more economical streamlined connector. Write today.

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Use this Class "P" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.

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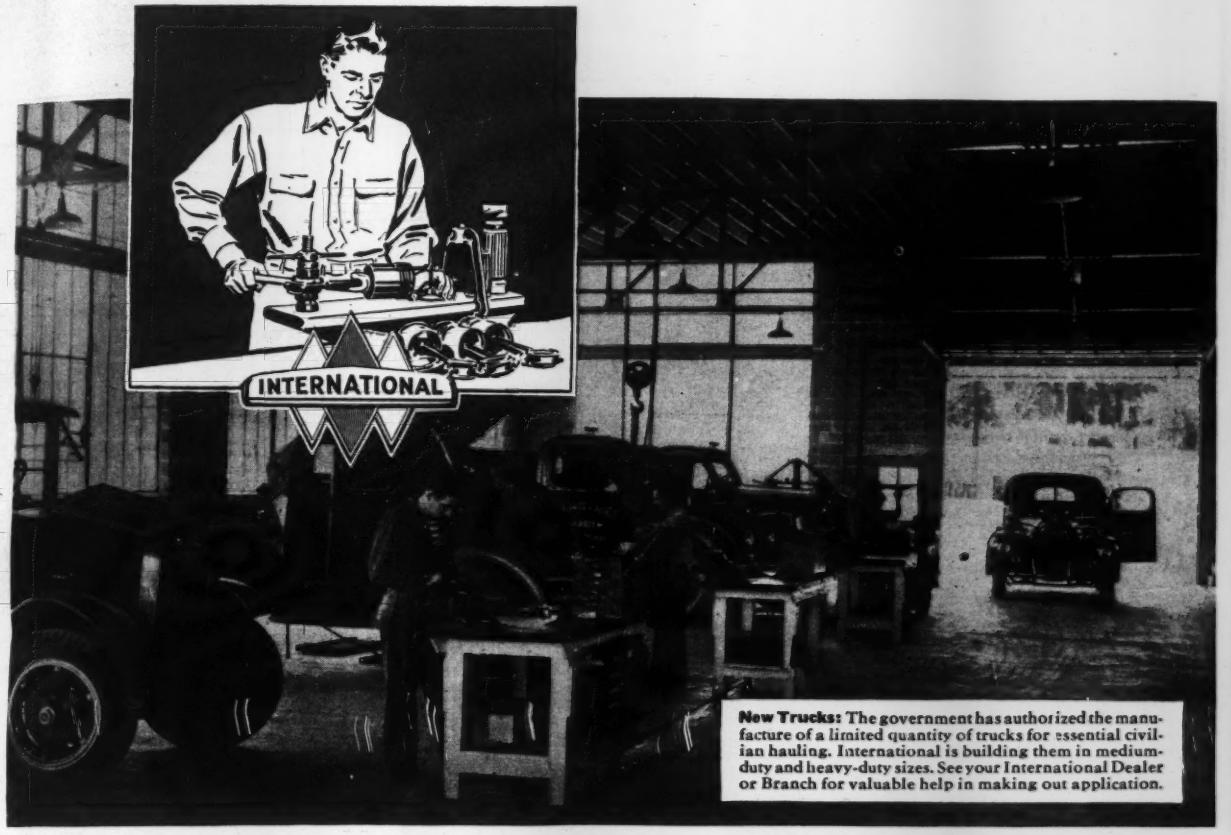
who know what's expected of them–



New Trucks: The government has authorized the manufacture of a limited quantity of trucks for essential civilian hauling. International is building them in medium-duty and heavy-duty sizes. See your International Dealer or Branch for valuable help in making out application.

What's most important about truck service today?

Isn't it this: That the men who provide the service know what's expected of them . . . know that somehow they've got to keep overage trucks at work, hauling the million-and-one things a victory-bound nation needs?

Every day these men fix old trucks long overdue at the scrap heap—trucks that almost say, "I defy you to keep me hauling at a reasonable operating cost." The service men don't scare. Their attitude seems to be: "You can't bluff me, old timer, I'll keep you humping." And they do.

The service men at International Truck Branches, the nation's largest company-owned truck-service organization, and the service men who work for more than 5,000 International Truck Dealers aren't supermen. Sure, they have top tools, equipment and experience, and genuine International Parts. But they also know what's expected of them—know that unless they keep old trucks rolling, some of the things a victory-bound nation needs won't get there.

These men get no honors. They simply do what is needful—keep overage trucks at work when we'd all suffer seriously if the old trucks failed to perform.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue
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HARVESTER

INTERNATIONAL *Trucks*

When You're Pouring Concrete, Use . . .

SISALKRAFT

OVER THE SLAB . . . TO CURE AND PROTECT FROM DRIP AND DEBRIS

Waterproof, tear-resistant, scuff-proof SISALKRAFT retards evaporation and protects the concrete from dirt, dripping grout and debris.

ALL AROUND THE JOB FOR PROTECTION FROM FROST

Used all around the building, SISALKRAFT holds in the heat from salamanders or other heating units. On the large building job illustrated, the SISALKRAFT blankets are all in place, despite a gale that lasted 24 hrs.

For nearly 25 years the unmatched performance of SISALKRAFT has made it the Number One concrete curing and protecting agent. Use it when you're pouring concrete — for buildings, runways and roads.

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Manufacturers of SISALKRAFT, PIONEER SISAL-K, SISALTAPE AND COPPER-REINFORCED SISALKRAFT

POSTWAR PROJECTS (Cont'd)

Tex., San Antonio — FACTORY — Martin Fluorescent Mfg. Co., 312 Fredericksburg Rd., plans 50% completed factory. $45,000. Funds available. CD 10/24—ENR 10/26 under Industrial Bldgs.

Wis., Waukesha — GARAGE — Waukesha Co., brick, rein.-con. garage addn. $50,000. Financing not provided. E. J. Stephan, Waukesha, engr.

READY FOR BIDS

★**N. Y., New York**—MILK PLANT, etc.—Dairymen's League Cooperative Assn., Inc., 11 W. 42 St., New York, Zone 18, plans completed by J. Feld, 103 Park Ave., New York, Zone 17, 4 story factory, milk plant, 1 story garage, repair shop, 12 Ave., 47 and 48 Sts. $650,000.

UNCLASSIFIED

PROPOSED WORK

Ariz., Bylas—AIRPORT—Town, airport grading, paving, etc. $29,280. CAA will help finance.

Ariz., Cameron—AIRPORT—Town, airport grading, paving, lighting, etc. $320,400. CAA will help finance.

Ariz., Camp Verde — AIRPORT—Town, airport grading, paving, lighting, etc. $221,960. CAA will help finance.

Ariz., Casa Grande — AIRPORT — Town airport grading, paving, lighting, etc. $191,500. CAA will help finance.

Ariz., Chinle—AIRPORT—Town, airport grading, paving, lighting, etc. $315,950. CAA will help finance.

Ariz., Chino Valley—AIRPORT—Town, airport grading, paving, etc. $32,300. CAA will help finance.

Ariz., Coolidge Dam—AIRPORT—Town, airport grading, paving, etc. $29,180. CAA will help finance.

Ariz., Duncan—AIRPORT—Town, airport grading, etc. $32,180. CAA will help finance.

Ariz., Fort Apache—AIRPORT—City, airport grading, paving, etc. $64,300. CAA will help finance.

Ariz., Globe-Miami—AIRPORT—Cities airport grading, paving, lighting, etc. $423,470. CAA will help finance.

Ariz., Fredonia—AIRPORT—City, airport grading, paving, etc. $58,800. CAA will help finance.

Ariz., Gila Bend—AIRPORT—City, airport grading, paving, lighting. $289,130. CAA will help finance.

Ariz., Hayden-Winkelman — AIRPORT — Cities, airport grading, paving, lighting, etc. $348,970. CAA will help finance.

Ariz., Holbrook—AIRPORT—City, airport paving, grading, lighting, etc. $391,320. CAA will help finance.

Ariz., Jacob Lake—AIRPORT—City, airport grading, paving, lighting, etc. $355,740. CAA will help finance.

Ariz., Lake Pleasant (mail Marinette) — AIRPORT — City, airport grading, paving, etc. $49,800. CAA will help finance.

Ariz., Lakeside—AIRPORT—City, airport grading, paving, etc. $43,300. CAA will help finance.

Ariz., Leupp—AIRPORT—Town, airport grading, paving, lighting, etc. $259,790. CAA will help finance.

Ariz., Littlefield—AIRPORT—City, airport grading, lighting, etc. $38,900. CAA will help finance.

Ariz., Marble Canyon—AIRPORT—Town, airport grading, etc. $32,180. CAA will help finance.

Ariz., Morenci-Clifton—AIRPORT—Towns, airport grading, paving, lighting, etc. $315,950. CAA will help finance.

Ariz., Mormon Lake — AIRPORT — Town, airport grading, paving, lighting, etc. $203,140. CAA will help finance.

Ariz., Oraibi—AIRPORT—Town, airport grading, paving, lighting, etc. $184,730. CAA will help finance.

Ariz., Parker—AIRPORT—Town, airport grading, paving, lighting, etc. $167,000. CAA will help finance.

Ariz., Patagonia—AIRPORT—Town, airport grading, etc. $32,180. CAA will help finance.

Ariz., Pierces Ferry — AIRPORT — Town, airport grading, paving, etc. $29,180. CAA will help finance.

Ariz., Prescott—AIRPORT—Town, airport grading, paving, lighting, etc. $132,650. CAA will help finance.

Ariz, Safford—AIRPORT—Town, airport grading, paving. $25,000. CAA will help finance.

Ariz., Superior-Ray — AIRPORT — Towns, airport grading, paving, lighting, etc. $415,950. CAA will help finance.

Ariz., Tuba City—AIRPORT—Town, airport grading, paving, lighting, etc. $132,000. CAA will help finance.

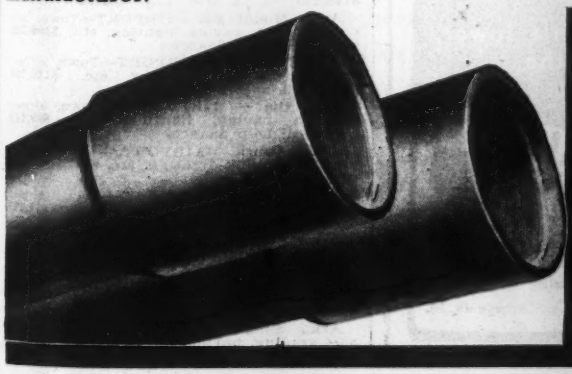
WITHOUT STEEL CHINA EMPLOYS ANCESTRAL WAYS

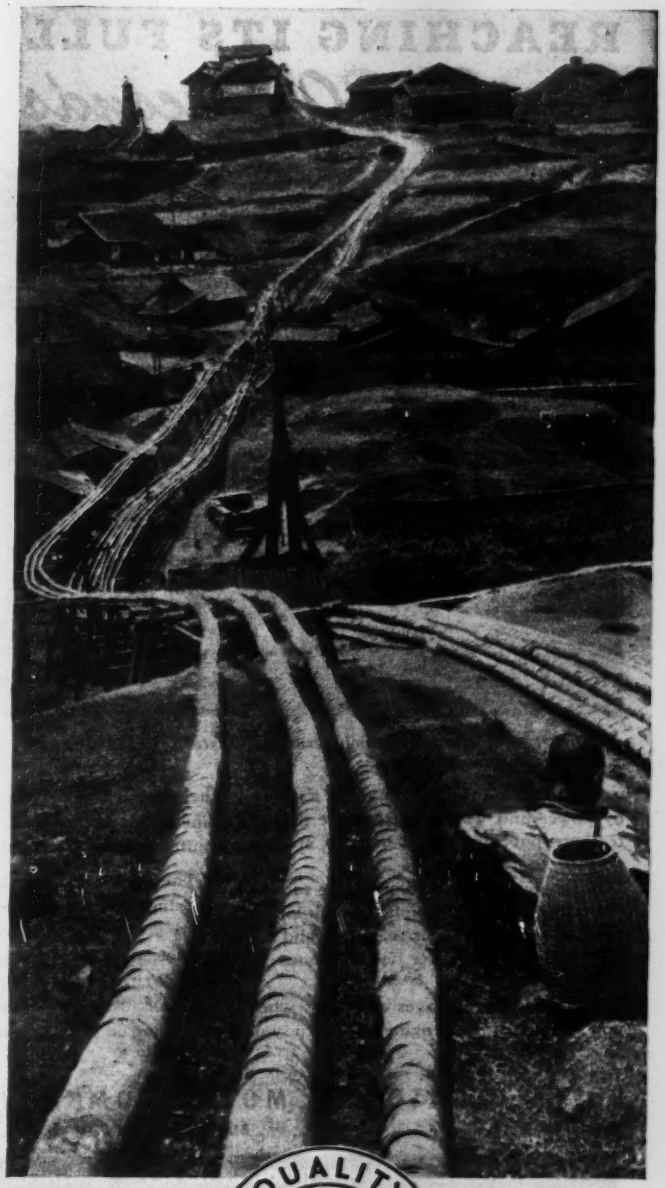
THIS picture might have been taken centuries ago. It shows a bamboo pipeline, carrying brine from 2,600 year old salt mines to a refinery in the heart of modern China. Here in Tse Liu Ching, Szechwan province, steel pipe is not available, and the Generalissimo's engineers must use primitive bamboo pipe as a wartime substitute.

Of course the bamboo pipe splits, is eaten by insects, deteriorates with age and sun. Every day coolies must repair it, by wrapping the lines with bamboo strips. There are countless sizes of bamboo pipe, all different (and none of them big enough). And the technique of making permanent water-tight joints is unknown.

But this bamboo pipe points to what we in America seldom realize..the importance of steel. Low-cost durable steel pipe, for example, is a priceless ingredient of our civilization. Without it we could not have our pure water supplies, or our sanitary systems. Our railroads, factories, oil fields and power plants could not exist without modern steel pipe.

Steel is America's No. 1 basic industry. The whole structure of American life--with all its security, convenience and comfort--depends upon the steel and steel products of which Youngstown is a leading manufacturer.





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SERVICE

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YOUNGSTOWN, OHIO

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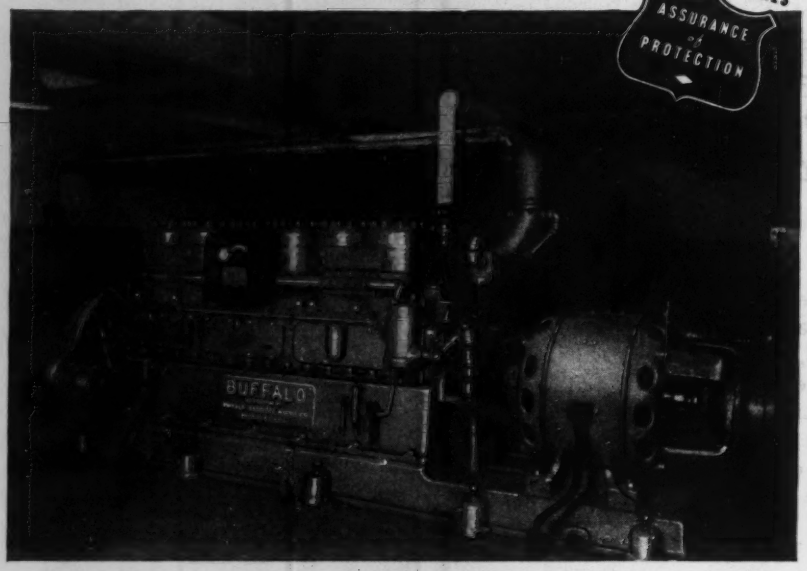
In 30 Seconds

BUFFALO ENGINES
ASSURANCE of PROTECTION



Model ATT—for emergency service—Western Union Tel. Co., St. Louis, Mo.

The big thing that the buyer of a stand-by power unit wants is assurance of protection—but some extra benefits are important too.

For instance, in a public service such as the telephone or telegraph, a break longer than a half-minute isn't tolerated, and the motor speed and power delivery must be constant.

Such extra advantages are yours when you select a Buffalo engine and a study of their specifications will prove to the engineer that for unfailing dependability the Buffalo engine is beyond doubt.

The men who have been building and installing these engines for over forty years are at your service in providing information to help you plan your installation. Write for engine Specification Sheets for your files and for the answers to your questions on installation layouts.

BUFFALO GASOLENE MOTOR COMPANY
DEPT. NR-15 BUFFALO 13, N. Y., U. S. A.

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ASSURANCE of PROTECTION

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P.— IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

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Simplex
LEVER SCREW HYDRAULIC
Jacks

for every construction purpose
Awarded the Gold Medal for Safety
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POSTWAR PROJECTS (Cont'd.)

Ariz., Verde Valley — AIRPORT — Town, airport grading, paving, lighting, etc. $390,950. CAA will help finance.

Ariz., Wickenburg—AIRPORT—City, airport grading, paving, lighting, etc. $400,000. CAA will help finance.

Ariz., Wickieup — AIRPORT — Town, airport grading, lighting, etc. $154,300. CAA will help finance.

Ark., Ashdown — AIRPORT — Town, airport grading, paving, lighting, etc. $133,050. CAA will help finance.

Ark., Atkins — AIRPORT — Town, airport grading, lighting, paving, etc. $97,229. CAA will help finance.

Ark., Augusta—AIRPORT—Town, airport grading, paving, lighting, etc. $92,581. CAA will help finance.

Ark., Beebe — AIRPORT — Town, airport grading, paving, lighting, etc. $100,152. CAA will help finance.

Ark., Berryville—AIRPORT—Town, airport grading, paving, lighting, etc. $340,678. CAA will help finance.

Ark., Blytheville — AIRPORT — City, airport grading, paving, lighting, etc. $410,923. CAA will help finance.

Ark., Camden — AIRPORT — City, airport grading, paving, lighting, $357,870. CAA will help finance.

Ark., Clarendon — AIRPORT — Town, airport grading, paving lighting, etc. $145,200. CAA will help finance.

Ark., Clinton—AIRPORT—Town, airport grading, paving, lighting, etc. $134,710. CAA will help finance.

Ark., Corning—AIRPORT—Town, airport grading, paving, lighting, etc. $119,075. CAA will help finance.

Ark., Dierks — AIRPORT — Town, airport grading, paving, lighting, etc. $125,015. CAA will help finance.

Ark., Dumas — AIRPORT — Town, airport grading, lighting, paving, etc. $126,580. CAA will help finance.

Ark., Elaine — AIRPORT — Town, airport grading, paving, lighting, etc. $100,810. CAA will help finance.

Ark., England—AIRPORT—Town, airport grading, paving, lighting, etc. $104,500. CAA will help finance.

Ark., Eudora—AIRPORT—Town, airport grading, paving, lighting, etc. $146,250. CAA will help finance.

Ark., Glenwood—AIRPORT—Town, airport grading, paving, lighting, etc. $156,035. CAA will help finance.

Ark., Gurdon—AIRPORT—Town, airport grading, paving, lighting, etc. $218,900. CAA will help finance.

Ark., Hamburg—AIRPORT—Town, airport grading, paving, lighting, etc. $129,800. CAA will help finance.

Ark., Heber Springs—AIRPORT—Town, airport grading, paving, lighting, etc. $141,320. CAA will help finance.

Ark., Huntsville—AIRPORT—Town, airport grading, paving, lighting, etc. $135,300. CAA will help finance.

Ark., Lake Village—AIRPORT—Town, airport grading, paving, lighting, etc. $141,490. CAA will help finance.

Ark., Luxora—AIRPORT—Town, airport grading, paving, lighting, etc. $98,890. CAA will help finance.

Ark., Marked Tree — AIRPORT — Town, airport grading, paving, lighting, etc. $85,910. CAA will help finance.

Ark., Marshall — AIRPORT — Town, airport grading, paving, lighting, etc. $181,140. CAA will help finance.

Ark., Morrilton—AIRPORT—Town, airport grading, paving, lighting, etc. $710,900. CAA will help finance.

Ark., Mountainview — AIRPORT — Town, airport grading, paving, lighting, etc. $148,225. CAA will help finance.

Ark., Mount Ida—AIRPORT—Town, airport grading, paving, lighting, etc. $100,760. CAA will help finance.

Ark., Nashville—AIRPORT—Town, airport grading, paving, lighting, etc. $145,790. CAA will help finance.

Ark., Ola — AIRPORT — Town, airport grading, paving, lighting, etc. $99,110. CAA will help finance.

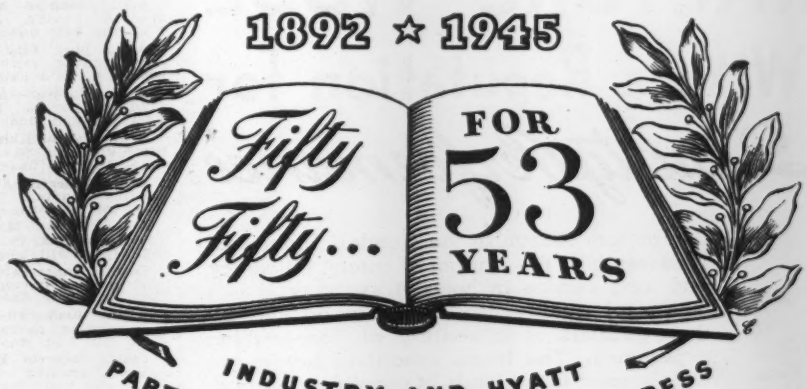
Ark., Ozark — AIRPORT — City, airport grading, paving, lighting, etc. $117,700. CAA will help finance.

Ark., Piggott—AIRPORT—Town, airport grading, paving, lighting, etc. $111,375. CAA will help finance.

Ark., Salem — AIRPORT — Town, airport grading, paving, lighting, etc. $146,575. CAA will help finance.

Ark., Sheridan — AIRPORT — Town, airport grading, paving, lighting, etc. $237,600. CAA will help finance.

Ark., Smackover—AIRPORT—Town, airport grading, paving, lighting, etc. $174,900. CAA will help finance.



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for fifty-three years

Shoulder to shoulder for over half a century, American Industry and Hyatt have worked together in the field of mechanical progress —solving ever and ever more complex engineering design problems and arriving at higher and higher precision and performance.

Today, we want to thank Industry for its generous understanding of Hyatt's wartime obligation of first serving our country. Also, we want to assure Industry that there will be compensations —for the Hyatt Roller Bearings of peacetime will reflect valuable lessons learned in the making of super-precision and super-serviceable Hyatt Roller Bearings for the tools and weapons of war.

So shoulder to shoulder, American Industry and Hyatt will continue to new heights of accomplishment. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Chicago; Detroit; Pittsburgh; Oakland, California.

DIVISION OF

HYATT BEARINGS **GENERAL MOTORS**

CONTRACTORS' HOSE

With a Reputation for *Quality Performance*

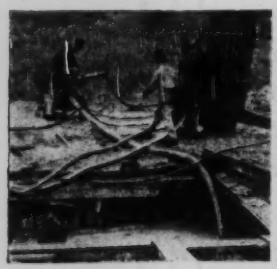
Contractors recognize the Goodall Cloverleaf Trademark as the symbol of safety, efficiency and long service in hose of every type . . . results of quality craftsmanship backed by three-quarters of a century of hose-making experience. The items described below are widely used in all kinds of construction, road-building and general contracting.

AIR HOSE . . .

Made in several types of moulded-and-braided and wrapped duck constructions, for all light and heavy duty pneumatic tool service . . . "Subway", "Mine King", "Allgood Cord", "Oil King". Some are all-synplastic.

STEAM HOSE

Goodall Steam Hose construction assures safe, reliable service on pile driving and all other steam jobs, at maximum working pressures and temperatures. "Inferno", "Judson" and "76" are familiar to construction, road-building and mining men because of the many years through which they have set the standard for steam hose quality.



SUCTION HOSE

"Newtype Cord" is the best hose made for suction and discharge work. Tough, flexible, crush-resistant. Can be quickly rounded into shape again if run over or otherwise distorted. Smooth bore withstands excessive abrasive wear. Sizes 1¼" to 4".

CONTRACTORS' WATER HOSE . . .

"Roadbuilders" has a reputation for *quality* performance on pavers, mixers and other heavy-duty equipment. "Buckskin" and "Bellwood" are equally well-known for their long-life economy in general service.

GOODALL BOOTS and CLOTHING

"Goodall" is the answer, when men want protection from rough wear and weather . . . *plus comfort.* "Industrial" Brand Boots . . . made of tough, black rubber, reinforced at bending points. Long-wearing, slip-proof soles. "Industrial Toe-Saver"—same as above, plus patented steel box safety toe. "Goodall" and "Champion" Shaft Suits . . . waterproof, dull-finished rubber, made for roominess and comfort. "Goodall Style 338" Coat . . . heavy gauge rubber on tear-resistant fabric. 50" long.

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Factory—Trenton, N. J. (Est. 1870) 75 Years of "Know How"—Our Most Valuable Commodity.

POSTWAR PROJECTS (Cont'd.)

Ark., Springdale—AIRPORT—Town, airport grading, paving, lighting, etc. $116,000. CAA will help finance.

Ark., Stamps—AIRPORT—City, airport grading, paving, lighting, etc. $176,000. CAA will help finance.

Ark., Star City—AIRPORT—Town, airport grading, paving, lighting, etc. $182,890. CAA will help finance.

Ark., Waldron—AIRPORT—Town, airport grading, paving, lighting, etc. $104,500. CAA will help finance.

Ark., Walnut Ridge—AIRPORT—City, airport grading, paving, lighting. $256,300. CAA will help finance.

Ark., Warren—AIRPORT—Town, airport grading, paving, lighting, etc. $123,417. CAA will help finance.

Ark., West Memphis—AIRPORT—City, airport grading, paving, lighting, etc. $104,390. CAA will help finance.

Calif., Bakersfield—AIRPORT—City, airport grading, paving, lighting, etc. $354,700. CAA will help finance.

Calif., Beckwith—AIRPORT—Town, airport grading, paving, lighting, etc. $91,520. CAA will help finance.

Calif., Beverly Hills—AIRPORT—City airport grading, paving, etc. $235,500. CAA will help finance.

Calif., Big Bear Lake—AIRPORT—Town, airport grading, etc. $31,600. CAA will help finance.

Calif., Big Sur—AIRPORT—Town, airport grading, paving, lighting, etc. $172,800. CAA will help finance.

Calif., Blue Canyon—AIRPORT—Town, airport grading, paving, lighting, etc. $56,600. CAA will help finance.

Calif., Brawley—AIRPORT—Town, airport grading, paving, lighting, etc. $191,500. CAA will help finance.

Calif., Brea—AIRPORT—Town, airport grading, paving, lighting, etc. $184,500. CAA will help finance.

Calif., Bridgeport—AIRPORT—Town, airport grading, paving, lighting, etc. $99,000. CAA will help finance.

Calif., Calipatria—AIRPORT—Town, airport grading, paving, lighting, etc. $243,000. CAA will help finance.

Calif., Calpine—AIRPORT—Town, airport grading, paving, lighting, etc. $111,000. CAA will help finance.

Calif., Cedarville—AIRPORT—Town, airport grading, etc. $40,750. CAA will help finance.

Calif., Chatsworth—AIRPORT—Town, airport grading, paving, lighting, etc. $80,700. CAA will help finance.

Calif., Chester—AIRPORT—Town, airport grading, paving lighting, etc. $98,740. CAA will help finance.

Calif., Chico—AIRPORT—Town, airport grading, paving, lighting, etc. $359,000. CAA will help finance.

Calif., Coalinga—AIRPORT—Town, airport grading, paving, lighting, etc. $182,300. CAA will help finance.

Calif., Colusa—AIRPORT—Town, airport grading, paving, lighting, etc. $231,950. CAA will help finance.

Calif., Corcoran—AIRPORT—Town, airport grading, paving, etc. $27,500. CAA will help finance.

Calif., Corning—AIRPORT—Town, airport grading, paving, lighting, etc. $129,800. CAA will help finance.

Calif., Corona—AIRPORT—Town, airport grading, paving, lighting, etc. $156,100. CAA will help finance.

Calif., Covelo—AIRPORT—Town, airport grading, paving, lighting, etc. $194,850. CAA will help finance.

Calif., Covina—AIRPORT—Town, airport grading, paving, lighting, etc. $171,000. CAA will help finance.

Calif., Crescent City—AIRPORT—Town, airport grading, paving, etc. $104,400. CAA will help finance.

Calif., Culver City—AIRPORT—City, airport lighting, etc. $71,000. CAA will help finance.

Calif., Danville—AIRPORT—Town, airport grading, paving, lighting, etc. $67,600. CAA will help finance.

Calif., Davis—AIRPORT—Town, airport grading, paving, lighting, etc. $234,600. CAA will help finance.

Calif., Del Mar—AIRPORT—Town, airport grading, paving, lighting, etc. $350,500. CAA will help finance.

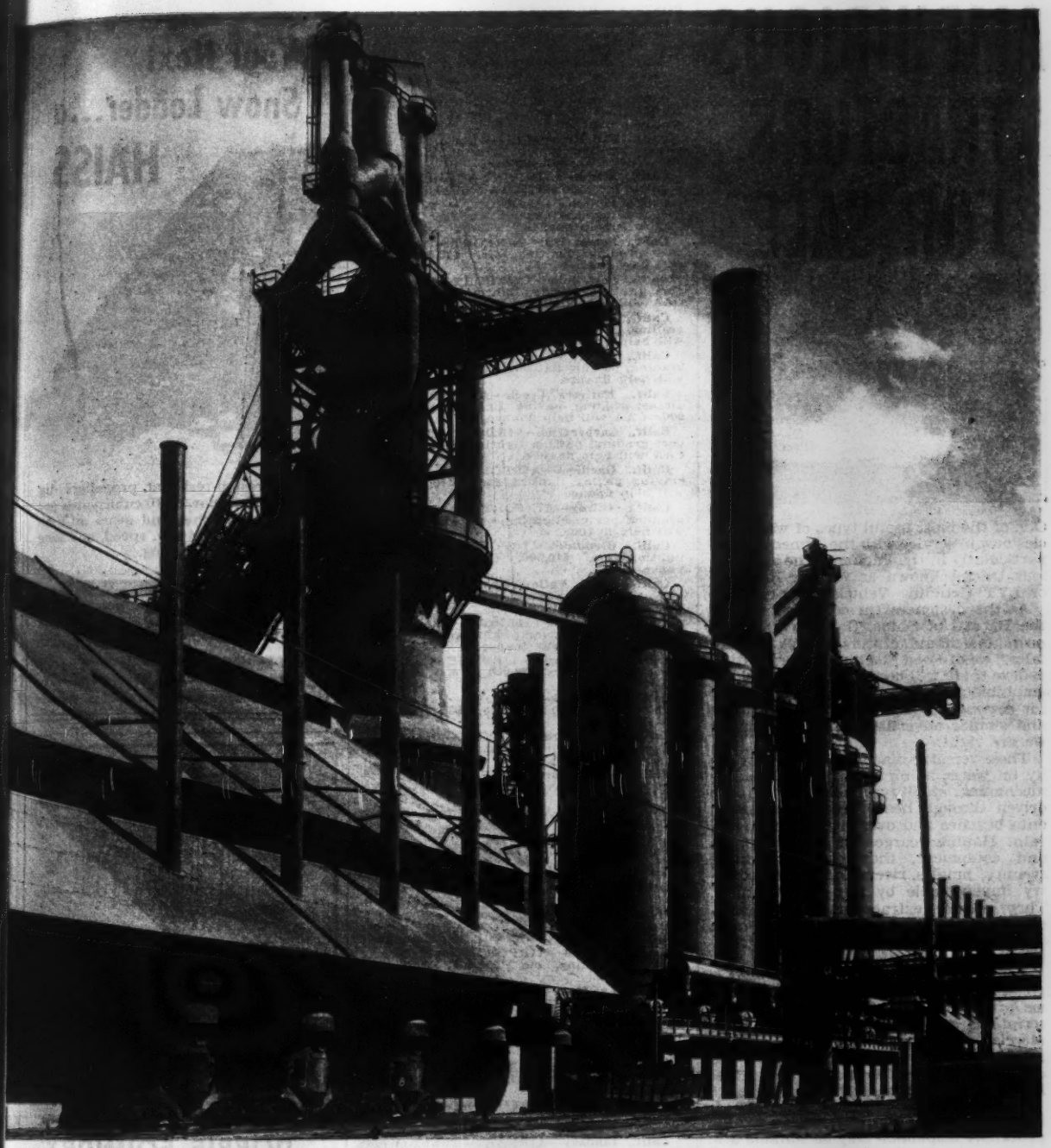
Calif., Delano—AIRPORT—Town, airport lighting. $26,000. CAA will help finance.

Calif., Desert Center—AIRPORT—Town, airport lighting, $25,000. CAA will help finance.

Calif., Dunsmuir—AIRPORT—Town, airport grading, paving, lighting, etc. $138,700. CAA will help finance.

Calif., East Pasadena—AIRPORT—City, airport, grading, paving, lighting, etc. $150,000. CAA will help finance.

Calif., El Cajon—AIRPORT—City, airport grading, paving, lighting, etc. $195,500. CAA will help finance.



BLAST FURNACES to increase our country's steel making capacity

The Columbia Steel Company, subsidiary of the United States Steel Corporation, built a complete new steel mill at Geneva, Utah, to increase the steel making capacity in this country. The three blast furnaces at this plant, together with three sets of blast furnace stoves, dust catchers, gas washers, uptakes, downcomers, hot blast piping, precipitator piping, air mains and gas mains, were fabricated and erected by our organization. Two of the Geneva blast furnaces are shown in the above view. They are of welded construction throughout.

We are equipped to fabricate and erect large steel plate construction jobs like this one, as well as steel storage tanks of all types. Write our nearest office for quotations.

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Tulsa 3.....1617 Hunt Bldg.
Birmingham 1.....1520 North Fiftieth Street
Washington 4.....703 Atlantic Bldg.
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AMPHIBIOUS TRACTORS FOR SALE

One of the most useful types of war vehicles now in service with the Armed Forces, particularly in the Pacific, is the amphibious tractor known as "Water Buffalo," or LVT (Landing Vehicle, Tracked).

As the designers (in cooperation with the Bureau of Ships, U. S. Navy), engineers and manufacturers of "Water Buffalos," we of Food Machinery Corporation believe there will be a postwar market for amphibious tractors redesigned and built for *commercial* use. The purpose of this and similar advertising is to find out if we are right.

These versatile machines travel as readily on water as on land. Their amazing mechanical stability enables them to be driven through heavy seas, across reefs, onto beaches and over the roughest terrain. Hauling cargos of men, supplies and equipment, they easily negotiate swamps, jungles, rivers and rugged country impenetrable by any other vehicle. They possess extraordinary maneuverability, power and traction... turn on a dime, knock over trees, climb like mountain goats!

Now our entire output of amphibians is going to the Army, Navy and Marines. But we have published a folder containing descriptions and specifications for a commercial amphibian. We will be glad to send this folder to interested business executives who feel that their firm might have use for a postwar "Water Buffalo."

Some of the operations for which the peacetime amphibian may be suitable are:

- Mine prospecting
- Mining
- Surveying
- Rescue work in flood, ice and marshland
- Flood control work
- Maintenance of oil, water, power and telephone lines
- Non-navigable river transportation
- Timber cruising
- Lumbering
- Road construction
- Equipment hauling
- Geologic work
- Jungle trucking
- Mosquito control
- Coast transportation, particularly where no dock facilities are available

Probably, after reading our folder, other uses will occur to you, possibly in your own field. Write for the folder to "Water Buffalo," Food Machinery Corporation, Riverside, California.

FOOD MACHINERY CORPORATION

RIVERSIDE DIVISION, RIVERSIDE, CALIFORNIA

POSTWAR PROJECTS (Cont'd.)

Calif., Elsinore—AIRPORT—Town, airport grading, paving, lighting, etc. $126,000. CAA will help finance.

Calif., Escondido—AIRPORT—Town, airport grading, paving, lighting, etc. $205,500. CAA will help finance.

Calif., Eureka—AIRPORT—City, airport grading, paving, lighting, etc. $75,000. CAA will help finance.

Calif., Fall River Mills—AIRPORT—Town, airport grading, paving, lighting, etc. $147,500. CAA will help finance.

Calif., Felton—AIRPORT—Town, airport, grading, etc. $25,000. CAA will help finance.

Calif., Fontana — AIRPORT — Town, airport grading, paving, lighting, etc. $208,000. CAA will help finance.

Calif., Forest Hill—AIRPORT—Town, airport grading, lighting, etc. $72,500. CAA will help finance.

Calif., Fort Jones—AIRPORT—Town, airport grading, paving, lighting, etc. $89,100. CAA will help finance.

Calif., Fortuna—AIRPORT—Town, airport grading, paving, lighting, etc. $150,100. CAA will help finance.

Calif., Fresno — AIRPORT — City, airport grading, paving, lighting, etc. $339,800. CAA will help finance.

Calif., Furnace Creek—AIRPORT—Town, airport grading, paving, lighting, etc. $248,000. CAA will help finance.

Calif., Garberville—AIRPORT—Town, airport grading, paving, lighting, etc. $163,000. CAA will help finance.

Calif., Gardena—AIRPORT—City, airport grading, paving, lighting, etc. $245,700. CAA will help finance.

Calif., Gilroy—AIRPORT—Town, airport grading, paving, lighting, etc. $140,900. CAA will help finance.

Calif., Glendale—AIRPORT—City, airport lighting, etc. $40,000. CAA will help finance.

Calif., Grass Valley — AIRPORT — Town, airport grading, paving, lighting, etc. $322,800. CAA will help finance.

Calif., Hanford—AIRPORT—Town, airport, grading, paving, lighting, etc. $404,000. CAA will help finance.

Calif., Hawthorne—AIRPORT—City, airport lighting, etc. $29,000. CAA will help finance.

Calif., Hayfork—AIRPORT—Town, airport grading, lighting, etc. $35,000. CAA will help finance.

Calif., Hayward—AIRPORT—City, airport grading, paving, lighting, etc. $187,500. CAA will help finance.

Calif., Healdsburg—AIRPORT—City, airport grading, paving, etc. $34,000. CAA will help finance.

Calif., Hemet—AIRPORT—Town, airport grading, paving, lighting, etc. $165,500. CAA will help finance.

Calif., Idyllwild—AIRPORT—Town, airport grading, etc. $25,000. CAA will help finance.

Calif., Imperial—AIRPORT—Town, airport grading, paving, lighting, etc. $145,500. CAA will help finance.

Calif., Inyokern—AIRPORT—City, airport lighting, $32,000. CAA will help finance.

Calif., Jackson—AIRPORT—Town, airport grading, lighting, etc. $56,000. CAA will help finance.

Calif., La Mesa—AIRPORT—City, airport grading, paving, lighting, etc. $185,500. CAA will help finance.

Calif., Lake Arrowhead — AIRPORT — Town, airport grading, etc. $75,800. CAA will help finance.

Calif., Leevining—AIRPORT—Town, airport grading, paving, lighting, etc. $98,000. CAA will help finance.

Calif., Lincoln—AIRPORT—Town, airport grading, paving, lighting, etc. $289,200. CAA will help finance.

Calif., Lindsay—AIRPORT—Town, airport grading, paving, lighting, etc. $136,000. CAA will help finance.

Calif., Little River—AIRPORT—Town, airport grading, paving, lighting, etc. $348,800. CAA will help finance.

Calif., Livermore—AIRPORT—City, airport grading, paving, lighting, etc. $205,500. CAA will help finance.

Calif., Lodi—AIRPORT—City, airport grading, paving, lighting, etc. $180,700. CAA will help finance.

Calif., Lomita—AIRPORT—City, airport lighting, etc. $36,000. CAA will help finance.

Calif., Los Banos—AIRPORT—City, airport grading, paving, lighting, etc. $234,900. CAA will help finance.

Calif., Manzanar—AIRPORT—Town, airport grading, paving. $45,500. CAA will help finance.

Calif., Mariposa—AIRPORT—Town, airport grading, paving, lighting, etc. $25,200. CAA will help finance.

Calif., Marysville—AIRPORT—City, airport grading, paving, lighting, etc. $131,700. CAA will help finance.

Your Next Snow Loader... a HAISS

Its abrasion-resistant propellers dig into frozen snow at 10 cubic yards per minute. Clutches and gears oil-bath enclosed. For power, speed, and long life. Write for catalog.

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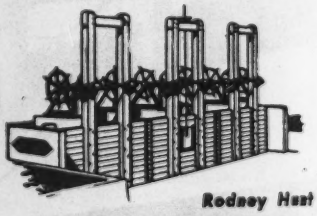

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Are you interested in metal or timber sluice gates? Also hoists, stands or other water controlling apparatus? Rodney Hunt has over 100 years' experience making this type of equipment.

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STEEL DERRICKS

TIMBER DERRICKS

FITTINGS

BLOCKS
Hook & Shackle

after VICTORY

We enter the new year with a profound feeling that Victory is not far away—that soon LIMA Shovels, Cranes and Draglines will be coming off the assembly lines ear-marked for peacetime operation.

When peacetime comes LIMA will have a line of Shovels, Cranes and Draglines that will be especially designed and built for the big jobs that you have planned for the future. This war has provided a tough proving ground for excavators and material handling equipment. It has brought to the forefront the ruggedness and dependability of LIMA-MADE equipment, built to perform under extreme pressure. As their wartime task continues, LIMA engineers continue to make improvements in design and construction that you may have, after Victory, the best shovels, cranes and draglines built.

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LIMA, OHIO, U. S. A.

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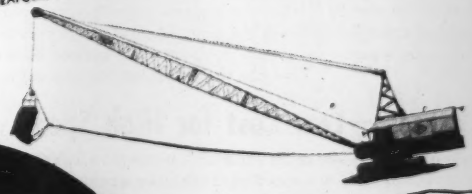

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SPECIAL PICK-UP and delivery of shipments at both ends, with speed of flight in between! The great economy of Air Express must be figured in terms of *time*. When time means money, Air Express saves both.

THOUSANDS of manufacturers have found that Air Express usually saves many times over its cost. (Any item anywhere in the nation is yours in a matter of hours, so long as the shipment fits in a plane.)

Specify Air Express—Low Cost for High Speed

25 lbs., for instance, travels more than 500 miles for $4.38, more than 1,000 miles for $8.75, more than 2,000 miles for $17.50, at a speed of three miles a minute—with cost including special pick-up and delivery in all U. S. cities and principal towns. (Often same-day delivery between airport towns and cities.) Direct service to scores of foreign countries. Rapid air-rail service to 23,000 off-airline points in the United States.

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Representing the AIRLINES of the United States

POSTWAR PROJECTS (Cont'd.)

Calif., Merced—AIRPORT—Town, airport grading, paving, lighting, etc. $52,000. CAA will help finance.

Calif., Midway City—AIRPORT—City, airport grading, paving, lighting, etc. $84,500. CAA will help finance.

Calif., Modesto—AIRPORT—City, airport grading, paving, lighting, etc. $129,000. CAA will help finance.

Calif., Mojave—AIRPORT—City, airport lighting. $30,500. CAA will help finance.

Calif., Monrovia—AIRPORT—Town, airport grading, paving, lighting, etc. $113,500. CAA will help finance.

Calif., Montebello—AIRPORT—Town, airport grading, paving, lighting, etc. $228,000. CAA will help finance.

Calif., Monterey—AIRPORT—City, airport grading, paving, lighting, etc. $56,300. CAA will help finance.

Calif., Moraga—AIRPORT—City, airport grading, paving, etc. $41,000. CAA will help finance.

Calif., Napa—AIRPORT—City, airport grading, paving, lighting, etc. $383,000. CAA will help finance.

Calif., National City—AIRPORT—City airport, grading, paving, lighting, etc. $132,500. CAA will help finance.

Calif., Nevada City—AIRPORT—City airport grading, lighting, etc. $170,000. CAA will help finance.

Calif., Newark—AIRPORT—City, airport grading, paving, lighting, etc. $258,000. CAA will help finance.

Calif., Newhall—AIRPORT—Town, airport grading, paving, lighting, etc. $242,900. CAA will help finance.

Calif., Oceanside—AIRPORT—City, airport grading, paving, lighting, etc. $225,000. CAA will help finance.

Calif., Ontario—AIRPORT—City, airport lighting, etc. $42,500. CAA will help finance.

Calif., Orange—AIRPORT—City, airport grading, paving, lighting, etc. $164,400. CAA will help finance.

Calif., Oroville—AIRPORT—City, airport grading, paving, lighting, etc. $82,000. CAA will help finance.

Calif., Oxnard—AIRPORT—City, airport grading, paving, lighting, etc. $122,700. CAA will help finance.

Calif., Palm City—AIRPORT—City, airport grading, paving, lighting, etc. $151,900. CAA will help finance.

Calif., Paso Robles—AIRPORT—Town, airport grading, paving, lighting, etc. $56,500. CAA will help finance.

Calif., Petaluma—AIRPORT—Town, airport grading, etc. $26,000. CAA will help finance.

Calif., Pittsburg—AIRPORT—City, airport grading, paving, lighting, etc. $308,000. CAA will help finance.

Calif., Placerville—AIRPORT—City, airport grading, paving, lighting, etc. $141,000. CAA will help finance.

Calif., Pomona—AIRPORT—City, airport grading, paving, lighting, etc. $316,100. CAA will help finance.

Calif., Point Arena—AIRPORT—Town, airport grading, paving, lighting, etc. $106,000. CAA will help finance.

Calif., Point Reyes—AIRPORT—Town, airport grading, paving, lighting, etc. $212,000. CAA will help finance.

Calif., Quincy—AIRPORT—City, airport grading, paving, lighting, etc. $118,000. CAA will help finance.

Calif., Ravendale—AIRPORT—Town, airport grading, etc. $26,000. CAA will help finance.

Calif., Red Bluff—AIRPORT—Town, airport grading, paving, lighting, etc. $193,000. CAA will help finance.

Calif., Redding—AIRPORT—City, airport grading, paving, lighting, etc. $143,000. CAA will help finance.

Calif., Redlands—AIRPORT—City, airport grading, paving, lighting, etc. $181,000. CAA will finance.

Calif., Redwood City—AIRPORT—City, airport grading, paving, lighting, etc. $290,000. CAA will help finance.

Calif., Reedley—AIRPORT—Town, airport grading, paving, lighting, etc. $130,000. CAA will help finance.

Calif., Richmond—AIRPORT—City airport grading, paving, lighting, etc. $301,000. CAA will help finance.

Calif., Riverside—AIRPORT—City, airport grading, paving, lighting, etc. $292,500. CAA will help finance.

Calif., Roseville—AIRPORT—Town, airport grading, paving, lighting, etc. $198,000. CAA will help finance.

Calif., Sacramento—AIRPORT—City, airport grading, paving, lighting, etc. $423,000. CAA will help finance.

Calif., Salinas—AIRPORT—City, airport grading, paving, lighting, etc. $284,000. CAA will help finance.

Lightweight*

*means greater "digability"

You automatically step-up the "*digability*" of your dragline when you hook up a Hendrix *Lightweight* Bucket! With the advantage of being from 20% to 40% lighter than other buckets, type for type, you can use a larger bucket than that for which your machine was designed and yet maintain the allowable loaded weight. By the same token, you'll get bigger pay loads on operations requiring a long boom. In wet digging you increase your pay loads by leaving the water in the pit.

Hendrix Buckets are *engineered* to provide this greater "*digability*" through the elimination of all excess weight. This has been done without sacrificing any of the strength, durability and toughness so necessary in a dragline bucket. We took the load *out of the bucket* . . . to let you put it *inside!* Write for descriptive literature, or *ask your dealer.*

THROW YOUR SCRAP INTO THE FIGHT!

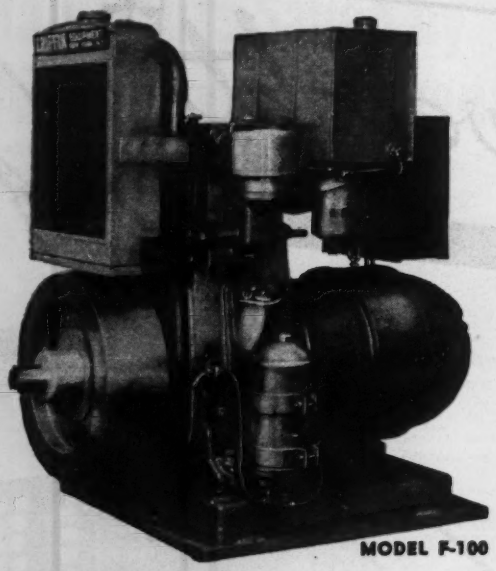
1. **ALL WELDED CONSTRUCTION—*no rivets***
2. **10% to 14% MANGANESE STEEL CHAINS and FITTINGS**
3. **20% to 40% LIGHTER THAN OTHER BUCKETS, *type for type***
4. **GETS FULL LOAD PAY MATERIAL EVERY TRIP *even in wet digging***
5. **PERFECT BALANCE *for ease of handling***

Three Types—Light, Medium and Heavy Duty
⅜ yd. to 20 yd.
Also available ***without*** *perforations*

HENDRIX
Lightweight **DRAGLINE BUCKETS**

DESOTO FOUNDRY, INC. • MANSFIELD, LOUISIANA

Engineered and built to give you the same dependable long life as all Griffin products.



MODEL F-100

Another Dependable

GRIFFIN DIESEL GENERATOR

Complete self-contained Diesel plant. 4½ KW and 9 KW. D.C. or A.C. Built for continuous service at low operating and maintenance costs.

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Disintegrated Concrete Abutments Renewed

Repairs To All Types of Masonry

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LOCOMOTIVE CRANES

20 to 50 TON CAPACITY

DIESEL • ELECTRIC • GASOLINE • STEAM

The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

POSTWAR PROJECTS (Cont'd)

Calif., San Luis Obispo—AIRPORT—City, airport imprvs. $45,000. CAA will help finance.

Calif., San Mateo—AIRPORT—City, airport grading, paving, lighting, etc. $294,000. CAA will help finance.

Calif., San Pedro—AIRPORT—City, airport grading, paving, lighting, etc. $342,000. CAA will help finance.

Calif., Sangar—AIRPORT—Town, airport grading, paving, lighting, etc. $85,000. CAA will help finance.

Calif., Santa Barbara—AIRPORT—City, airport grading, paving, lighting, etc. $247,000. CAA will help finance.

Calif., Santa Cruz—AIRPORT—City, airport grading, paving, lighting. $288,000. CAA will help finance.

Calif., Santa Maria—AIRPORT—City, airport grading, paving, lighting. $78,500. CAA will help finance.

Calif., Santa Paula—AIRPORT—Town, airport grading, paving, lighting, etc. $127,300. CAA will help finance.

Calif., Santa Rosa—AIRPORT—City, airport lighting. $29,000. CAA will help finance.

Calif., Saratoga—AIRPORT—City, airport grading, lighting, etc. $42,000. CAA will help finance.

Calif., Seal Beach—AIRPORT—City, airport grading, paving, etc. $27,800. CAA will help finance.

Calif., Selma — AIRPORT — City, airport grading, paving, lighting, etc. $93,000. CAA will help finance.

Calif., Silver Lake—AIRPORT—City, airport grading, paving, lighting. $181,000. CAA will help finance.

Calif., Sonora—AIRPORT—City, airport grading, paving, lighting, etc. $272,000. CAA will help finance.

Calif., Susanville—AIRPORT—City, airport grading, paving, lighting, etc. $195,000. CAA will help finance.

Calif., Tahoe City—AIRPORT—City, airport grading, lighting, etc. $38,000. CAA will help finance.

Calif., Tehachapi—AIRPORT—Town, airport grading, paving, lighting, etc. $228,800. CAA will help finance.

Calif., Thermal — AIRPORT — Town, airport lighting, etc. $32,500. CAA will help finance.

Calif., Tracy — AIRPORT — City, airport grading, paving, lighting, etc. $154,000. CAA will help finance.

Calif., Truckee—AIRPORT—Town, airport grading, paving, lighting, etc. $198,000. CAA will help finance.

Calif., Turlock—AIRPORT—City, airport grading, paving, lighting, etc. $86,000. CAA will help finance.

Calif., Ukiah—AIRPORT—Town, airport grading, paving, lighting, etc. $42,000. CAA will help finance.

Calif., Vallejo—AIRPORT—City, airport grading, paving, lighting, etc. $219,000. CAA will help finance.

Calif., Van Nuys—AIRPORT—City, airport grading, paving, lighting, etc. $85,800. CAA will help finance.

Calif., Ventura—AIRPORT—City, airport grading, paving, lighting, etc. $138,400. CAA will help finance.

Calif., Visalia—AIRPORT—City, airport grading, paving, etc. $33,100. CAA will help finance.

Calif., Warm Springs — AIRPORT — City, airport grading, lighting, etc. $37,000. CAA will help finance.

Calif., Watsonville—AIRPORT—City, airport grading, paving, etc. $57,000. CAA will help finance.

Calif., Wawona—AIRPORT—Town, airport grading, lighting, etc. $69,000. CAA will help finance.

Calif., Weaverville — AIRPORT — Town, airport grading, lighting, etc. $214,000. CAA will help finance.

Calif., Weed — AIRPORT — Town, airport grading, lighting, etc. $35,000. CAA will help finance.

Calif., Westwood—AIRPORT—Town, airport grading, lighting, etc. $143,000. CAA will help finance.

Calif., Whittier—AIRPORT—City, airport grading, paving, lighting, etc. $232,900. CAA will help finance.

Calif., Williams—AIRPORT—City, airport grading, paving, lighting, etc. $157,000. CAA will help finance.

Calif., Willits—AIRPORT—City, airport grading, etc. $37,000. CAA will help finance.

Calif., Willows—AIRPORT—City, airport imprvs. $35,000. CAA will help finance.

Calif., Wishon-Bass Lake — AIRPORT — Towns, airport grading, etc. $30,000. CAA will help finance.

Calif., Woodland — AIRPORT — City, airport grading, paving, lighting, etc. $83,000. CAA will help finance.

Calif., Woodside — AIRPORT — City, airport grading, paving, lighting, etc. $189,000. CAA will help finance.

10-point shatter-proof steel pipe

for post-war water lines

1. Offers greater all-round reliability—constant, dependable service.
2. Cuts installation, operating and maintenance costs.
3. Has low friction loss—greater carrying capacity.
4. Eliminates risk of sudden fractures—it's shatter-proof.
5. Withstands higher pressures.
6. Helps keep streets open for traffic.
7. Has greater resistance to earth movements.
8. Reduces water wastage because of fewer joints and leaks.
9. Has long life—many steel mains in service over 50 years.
10. Resists corrosion—In addition to A.W.W.A. coatings and linings, Duroline Pipe available for highly corrosive water.

IN keeping with the times, city engineers are now planning to use modern steel pipe for post-war water lines.

Seamless Steel Pipe has proved beyond question that it has the strength and endurance for the hardest jobs in the country. It has been used during the war for every conceivable purpose where utmost reliability was required. It has demonstrated beyond all doubt its ability to stand up under intense shock, constant vibration, washouts, earth movements and high pressures.

The use of National Seamless results in low laying costs. It comes in long lengths, has fewer joints, requires less labor to install. The clean, smooth interior means less friction and full flow. The smooth exterior permits easy application of coatings for corrosive soils. Pipe linings and coatings furnished in accordance with A.W.W.A. specifications. The strength of steel, plus the merits of seamless, give *the ultimate in pipe for water lines.*

Write for Bulletin No. 21 on steel pipe for water mains.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

WALLS WITHOUT WELDS

UNITED STATES STEEL

A Real Renewable Lip for Long Dipper Life and Economy

Old timers in power shovel operation know that renewable dipper lips were used almost as soon as replaceable teeth, both of them with the patent object of replacing the more quickly worn dipper parts as an obvious measure of economy.

But until 1930 the only renewable lips available were of the riveted type, with which, each time a change was made, the dipper must be dismounted and trucked to a repair shop, there to have the rivets cut or burned off and the new lip reriveted on. Either a spare dipper had to be available or the shovel would shut down until the old dipper was returned, a matter, usually, of days rather than hours.

To remedy this wasteful condition, the Amsco detachable rivetless lip was developed which could be replaced with only a few minutes' delay to shovel operations by means of the patented "U"-bolt fastening, interlocking-joint design.

The front (not the lip) is secured to the sides of the dipper by means of rivets and, when desirable, welding as well. Rivet holes are countersunk inside, and there are no pockets or obstructions to encourage clay building so that loading and dumping are fast and complete.

An Amsco renewable lip dipper on a Lima shovel owned by Groves, Lundin and Cox, Burgettstown, Pa., at work on track relocation project for the Pennsylvania Railroad. 1,023,000 yds. of clay, shale and rock were moved in making this cut.

R-619 shows a 2½ yd. Amsco renewable lip dipper. Note simplicity and security with which lip is fastened to body.

Amsco Conservation Welding Materials fight wear and restore worn dippers. Send for Bulletin 941-W.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

POSTWAR PROJECTS (Cont'd.)

Colo., Alamosa—AIRPORT—City, airport grading, paving, lighting, etc. $480,000. CAA will help finance.

Colo., Antonito—AIRPORT—City, airport grading, etc. $31,000. CAA will help finance.

Colo., Arvada — AIRPORT — City, airport grading, etc. $62,000. CAA will help finance.

Colo., Boulder—AIRPORT—City, airport grading, paving, lighting, etc. $191,000. CAA will help finance.

Colo., Brighton—AIRPORT—Town, airport grading, lighting, etc. $132,000. CAA will help finance.

Colo., Brush—AIRPORT—Town, airport grading, etc. $46,500. CAA will help finance.

Colo., Burlington—AIRPORT—Town, airport grading, lighting, etc. $97,000. CAA will help finance.

Colo., Canon City—AIRPORT—City, airport grading, lighting, etc. $150,000. CAA will help finance.

Colo., Castle Rock—AIRPORT—Town, airport grading, etc. $56,000. CAA will help finance.

Colo., Cheyenne Wells—AIRPORT—Town, airport grading, etc. $47,000. CAA will help finance.

Colo., Cortez—AIRPORT—Town, airport grading, lighting, etc. $143,000. CAA will help finance.

Colo., Craig—AIRPORT—City, airport grading, lighting, etc. $165,000. CAA will help finance.

Colo., Creede—AIRPORT—Town, airport grading, etc. $77,000. CAA will help finance.

Colo., Cripple Creek—AIRPORT—City, airport grading, etc. $98,000. CAA will help finance.

Colo., Del Norte—AIRPORT—City, airport grading, etc. $115,000. CAA will help finance.

Colo., Delta—AIRPORT City, airport grading, lighting, etc. $175,000. CAA will help finance.

Colo., Durango—AIRPORT—City, airport grading, paving, lighting, etc. $455,000. CAA will help finance.

Colo., Eagle — AIRPORT — City, airport grading, etc. $31,000. CAA will help finance.

Colo., Englewood—AIRPORT—Town, airport grading, etc. $127,000. CAA will help finance.

Colo., Estes Park—AIRPORT—Town, airport grading, lighting, etc. $210,000. CAA will help finance.

Colo., Florence—AIRPORT—City, airport grading, etc. $53,000. CAA will help finance.

Colo., Fort Collins—AIRPORT—Town, airport grading, paving, lighting, etc. $495,000. CAA will help finance.

Colo., Fort Morgan—AIRPORT—Town, airport grading, paving, lighting, etc. $378,000. CAA will help finance.

Colo., Glenwood Springs—AIRPORT—Town, airport grading, lighting, etc. $158,000. CAA will help finance.

Colo., Golden—AIRPORT—Town, airport grading, etc. $53,000. CAA will help finance.

Colo., Grand Junction—AIRPORT—City, airport grading, paving, lighting, etc. $115,000. CAA will help finance.

Colo., Gunnison—AIRPORT—City, airport grading, lighting, etc. $120,000. CAA will help finance.

Colo., Holly — AIRPORT — City, airport grading, etc. $37,000. CAA will help finance.

Colo., Holyoke—AIRPORT—City, airport grading, etc. $48,000. CAA will help finance.

Colo., Idaho Springs—AIRPORT—City, airport grading, etc. $88,000. CAA will help finance.

Colo., Julesburg—AIRPORT—Town, airport grading, etc. $36,000. CAA will help finance.

Colo., Kremmling—AIRPORT—City, airport grading, lighting, etc. $100,000. CAA will help finance.

Colo., Lafayette—AIRPORT—Town, airport grading, etc. $46,000. CAA will help finance.

Colo., Lamar—AIRPORT—Town, airport grading, paving, etc. $241,000. CAA will help finance.

Colo., Las Animas—AIRPORT—City, airport grading, etc. $72,000. CAA will help finance.

Colo., Leadville—AIRPORT—City, airport grading, lighting, etc. $152,000. CAA will help finance.

Colo., Limon—AIRPORT—Town, airport grading, lighting, etc. $160,000. CAA will help finance.

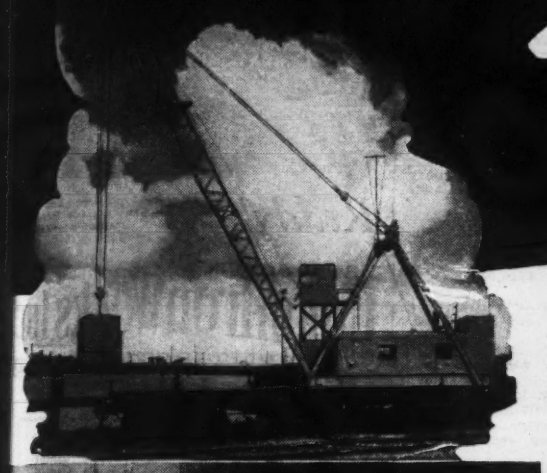
Colo., Littleton—AIRPORT—Town, airport grading, etc. $97,000. CAA will help finance.

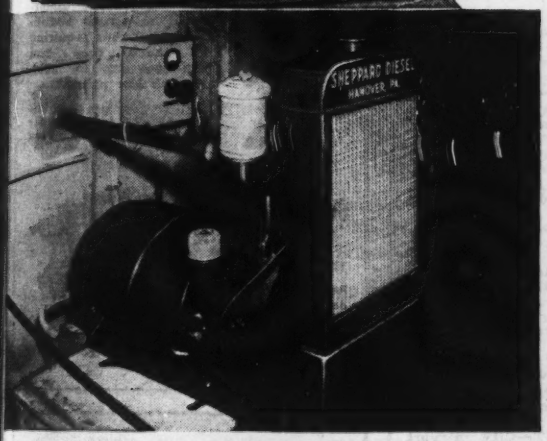
Colo., Longmont—AIRPORT—City, airport grading, lighting, etc. $213,000. CAA will help finance.

Colo., Louisville—AIRPORT—City, airport grading, etc. $61,000. CAA will help finance.

CHEAPER FUEL MEANS

Cheaper Electricity WITH A Sheppard DIESEL GENERATING SET





Sheppard Generating Sets provide low-cost, dependable lighting for 30-ton revolving barge-mounted cranes. These cranes are being built by Turney Manufacturing & Engineering Co. of Houston, Texas... Washington Iron Works, Seattle, Wash.... Pointer-Willamette Co., Portland, Ore. Note cleanliness and compact arrangement of entire unit.

LOWERS NIGHT OPERATING COSTS FOR HUGE 30-TON REVOLVING CRANE

IN hundreds of installations like this one, Sheppard Diesel Generating Sets cut electric bills for users. These generating sets make low cost electricity from cheap fuel. They'll even operate efficiently on the lowest priced domestic furnace oil! And use less of it! . . . for Sheppard Diesels are engineered to squeeze every last watt of power from every last drop of fuel!

Besides being thrifty, Sheppard Diesels are the simplified Diesels that give dependable service in the hands of any average operator. They're delivered fully adjusted . . . fully equipped. A Sheppard goes on the job fast . . . and stays on the job for keeps.

A limited number of Sheppard Diesels are now available. Let us advise you about obtaining WPB approval.

Mail coupon today for free literature describing Sheppard Diesel Generating Sets.

POWER UNITS, 8 TO 50 HP • GENERATING SETS, 3 TO 30 KW

R. H. Sheppard Company
110 Middle St., Hanover, Pa.

Please send me free literature describing Sheppard Diesel Generating Sets.

Name .....

Firm Name .....

Address .....

.....

Sheppard ALL AMERICAN DIESEL GENERATING SETS

For Schenectady

45,000,000 Gallons Daily From 9 Layne Units

Late in 1942, Schenectady faced a water crisis. New war industries and increased population demanded more and more water. The old system was over-burdened. Reserve was diminishing a million gallons daily.

Layne was given a contract that covered wells, pumps, electrical equipment and other essential apparatus. Layne New York Company put full crews on the job and in record time completed two wells in time to prevent a crisis. Seven other wells and pumps were soon ready and in service, giving Schenectady 45,000,000 gallons of fine water daily—and at a saving of $10,000 a year on operating cost.

Though constructed at extraordinary speed, operation was perfect and efficiency up to the guarantee. No other firm in America,—or perhaps in the entire world could have matched Layne's overall performance.

Layne Wells and Pumps are the world's finest in quality, efficiency, design and long life. For late literature address, Layne & Bowler, Inc. General Offices, Memphis 8, Tenn.

***LAYNE PUMPS**—fulfill every need for producing large quantities of water at low cost from wells, streams, mines or reservoirs. Send for literature.*

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

POSTWAR PROJECTS (Cont'd.)

Colo., Loveland—AIRPORT—City, airport grading, lighting, etc. $166,000. CAA will help finance.

Colo., Mancos—AIRPORT—City, airport grading, etc. $41,000. CAA will help finance.

Colo., Meeker—AIRPORT—City, airport grading, lighting, etc. $199,000. CAA will help finance.

Colo., Monte Vista—AIRPORT—City, airport grading, lighting, etc. $42,000. CAA will help finance.

Colo., Montrose—AIRPORT—City, airport grading, paving, lighting, etc. $390,000. CAA will help finance.

Colo., Oak Creek—AIRPORT—City, airport grading, etc. $94,000. CAA will help finance.

Colo., Ordway—AIRPORT—City, airport grading, etc. $25,500. CAA will help finance.

Colo., Ouray—AIRPORT—City, airport grading, etc. $92,000. CAA will help finance.

Colo., Pagosa Springs—AIRPORT—City, airport grading, lighting, etc. $141,000. CAA will help finance.

Colo., Pueblo—AIRPORT—City, airport grading, paving, etc. $237,000. CAA will help finance.

Colo., Rifle—AIRPORT—City, airport grading, lighting, etc. $105,000. CAA will help finance.

Colo., Rocky Ford—AIRPORT—City, airport grading, etc. $82,000. CAA will help finance.

Colo., Salida—AIRPORT—City, airport grading, paving, lighting, etc. $415,000. CAA will help finance.

Colo., Silverton—AIRPORT—City, airport grading, etc. $112,000. CAA will help finance.

Colo., Springfield—AIRPORT—City, airport grading, etc. $66,000. CAA will help finance.

Colo., Steamboat Springs—AIRPORT—Town, airport grading, etc. $140,000. CAA will help finance.

Colo., Sterling—AIRPORT—City, airport grading, paving, lighting, etc. $295,000. CAA will help finance.

Colo., Trinidad—AIRPORT—City, airport grading, paving, light, etc. $480,000. CAA will help finance.

Colo., Walden—AIRPORT—City, airport grading, etc. $52,000. CAA will help finance.

Colo., Walsenberg—AIRPORT—City, airport grading, paving, lighting, etc. $357,000. CAA will help finance.

Colo., Wray — AIRPORT — City, airport grading, etc. $35,500. CAA will help finance.

Colo., Yuma — AIRPORT — City, airport grading, etc. $25,500. CAA will help finance.

Conn., Branford—AIRPORT—City, airport grading, etc. $207,000. CAA will help finance.

Conn., Bridgeport—AIRPORT—City, airport grading, paving, lighting, etc. $192,000. CAA will help finance.

Conn., Darien—AIRPORT—City, airport grading, etc. $197,000. CAA will help finance.

Conn., East Hampton—AIRPORT—City, airport grading, etc. $206,000. CAA will help finance.

Conn., Glastonbury—AIRPORT—City, airport grading, etc. $236,000. CAA will help finance.

Conn., Groton-New London—AIRPORT—Cities, airport paving, etc. $70,000. CAA will help finance.

Conn., Hartford—AIRPORT—City, airport grading, paving, lighting, etc. $407,000. CAA will help finance.

Conn., Kent — AIRPORT — City, airport grading, etc. $177,000. CAA will help finance.

Conn., Manchester—AIRPORT—City, airport grading, paving, lighting, etc. $553,000. CAA will help finance.

Conn., Meriden—AIRPORT—City, airport grading, paving, lighting, etc. $351,000. CAA will help finance.

Conn., New Canaan—AIRPORT—City, airport grading, etc. $177,000. CAA will help finance.

Conn., New Milford—AIRPORT—City, airport grading, etc. $206,000. CAA will help finance.

Conn. Newtown—AIRPORT—City, airport grading, etc. $206,000. CAA will help finance.

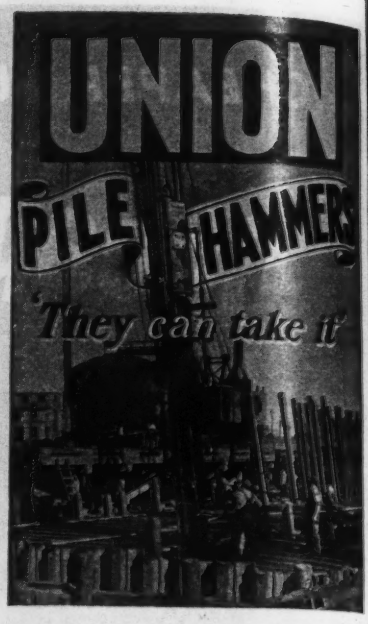
Conn., Plainfield—AIRPORT—City, airport grading, etc. $177,000. CAA will help finance.

Conn., Ridgefield — AIRPORT — City, airport grading, etc. $206,000. CAA will help finance.

Conn., Salisbury—AIRPORT—City, airport grading, etc. $177,000. CAA will help finance.

Conn., Southington—AIRPORT—City, airport grading, paving, lighting, etc. $459,000. CAA will help finance.

Conn., Stafford Springs—AIRPORT—City, airport grading, etc. $206,000. CAA will help finance.



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Union Iron Works, Inc.
ELIZABETH, New Jersey

Engineering visitors tell us—"we cannot understand how such beautiful instruments requiring so much time and patience—can be sold, at such low prices."

Rental Transits — Reasonable Rates. Send for handsome new catalog #491

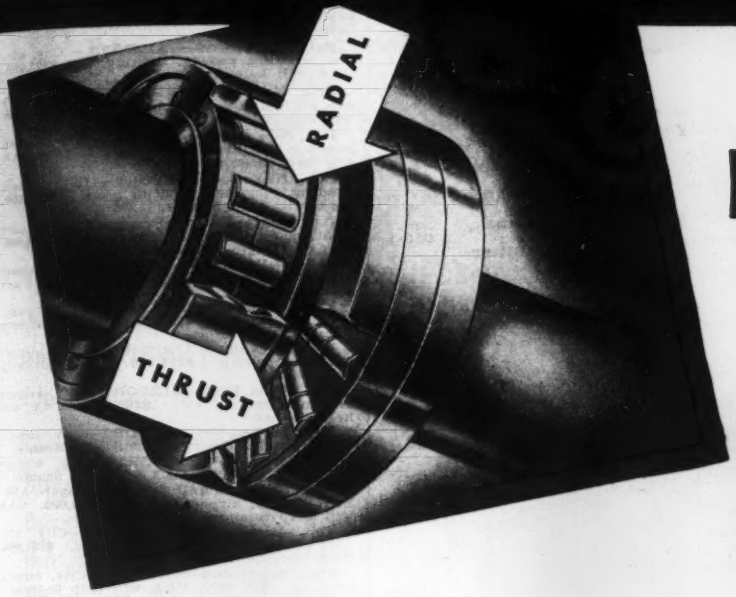
BUFF & BUFF INSTITUTE
J. P., Boston, Mass.

The BUFF "X" TELESCOPE has the finest and highest definition and simplest lens system. It is useful when the light is dim.

THE MOUNT VERNON BRIDGE CO.

Engineers Contractors
STRUCTURAL STEEL
RAILWAY AND HIGHWAY BRIDGES
BUILDINGS AND VIADUCTS
MOUNT VERNON, OHIO

Are Bearings the LIMITING FACTOR In YOUR Postwar *Design & Production*



Specify ROLLWAY *Right-Angle* LOADING *for*

1. Longer machine life
2. Greater machine efficiency
3. Less maintenance care

Whether your job is to re-design old products or to develop new ones, it breaks down into two phases:

1. **To design competitive sales appeal into the product; i.e., longer life, higher efficiency, and lower maintenance costs.**
2. **And to design or change-over production machinery for heavier loads, or higher speeds with less time out for service.**

In both of these, bearings are often the limiting factor. That's why Rollway's right-angle loading is so important. Right-angle loading insures that only simple loads are ever brought to bear on a single bearing. It automatically splits compound loads into pure radial and pure thrust . . . carries the radial load on a radial bearing, the thrust component on a thrust bearing . . . *both at right angles to the roller axis.* Oblique loads and their resultants are never introduced.

That means greater carrying capacity in given dimensional limits . . . or higher speed . . . or longer life . . . or proportional combinations of all three. It means lighter, more compact design . . . with firmer control over the distribution of stresses.

•

Proper Bearing Selection is a Specialist's Job; Let Rollway Engineers Help You

Just send a drawing or detailed statement of your problem and let our free Advisory Engineering Service help you in selecting the most efficient Rollway Bearings for your new and replacement designs. No obligation.

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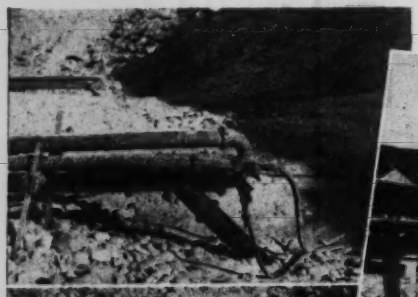

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POSTWAR PROJECTS (Cont'd.)

Del., Bethany Beach — AIRPORT — City, airport grading, lighting, etc. $35,000. CAA will help finance.

Del., Bridgeville—AIRPORT—City, airport grading, lighting, etc. $41,000. CAA will help finance.

Del., Claymont—AIRPORT—City, airport grading, paving, lighting, etc. $268,000. CAA will help finance.

Del., Delaware City—AIRPORT—City, airport grading, lighting, etc. $42,000. CAA will help finance.

Del., Delmar — AIRPORT — City, airport grading, lighting, etc. $38,000. CAA will help finance.

Del., Georgetown — AIRPORT — City, airport imprvs. $40,000. CAA will help finance.

Del., Harrington—AIRPORT—City, airport grading, lighting, etc. $47,000. CAA will help finance.

Del., Lewes — AIRPORT — City, airport grading, lighting, etc. $39,000. CAA will help finance.

Del., Middletown — AIRPORT — City, airport grading, paving, lighting, etc. $273,000. CAA will help finance.

Del., Milford — AIRPORT — City, airport grading, paving, lighting, etc. $275,000. CAA will help finance.

Del., New Castle—AIRPORT—City, airport grading, paving, lighting, etc. $284,000. CAA will help finance.

Del., Newark — AIRPORT — City, airport grading, paving, lighting, etc. $233,000. CAA will help finance.

Del., Seaford — AIRPORT — City, airport grading, paving, lighting, etc. $243,000. CAA will help finance.

Del., Selbyville—AIRPORT—City, airport grading, lighting, etc. $41,000. CAA will help finance.

Fla., Apopka-Ryan — AIRPORT — Towns, airport grading. $99,500. CAA will help finance.

Fla., Arcadia — AIRPORT — City, airport grading, paving. $271,250. CAA will help finance.

Fla., Avon Park—AIRPORT—City, airport grading, paving, etc. $292,250. CAA will help finance.

Fla., Barberville—AIRPORT—City, airport grading. $51,300. CAA will help finance.

Fla., Bartow — AIRPORT — City, airport lighting. $36,000. CAA will help finance.

Fla., Benton (Mail White Springs)—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., Blountstown—AIRPORT—City, airport grading, paving, lighting, etc. $381,000. CAA will help finance.

Fla., Bradenton—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., Brighton—AIRPORT—City, airport grading. $51,300. CAA will help finance.

Fla., Bunnell — AIRPORT — City, airport lighting. $36,000. CAA will help finance.

Fla., Cedar Keys—AIRPORT—City, airport grading, paving, lighting, etc. $391,500. CAA will help finance.

Fla., Century—AIRPORT—City, airport grading, paving. $371,000. CAA will help finance.

Fla., Chipley — AIRPORT — City, airport grading, paving, lighting, etc. $381,000. CAA will help finance.

Fla., Clearwater—AIRPORT—City, airport grading, paving. $487,000. CAA will help finance.

Fla., Clermont—AIRPORT—City, airport grading. $80,000. CAA will help finance.

Fla., Cocoa — AIRPORT — City, airport grading. $102,600. CAA will help finance.

Fla., Crescent City—AIRPORT—City, airport grading. $102,600. CAA will help finance.

Fla., Crystal River — AIRPORT — City, airport grading. $50,000. CAA will help finance.

Fla., Dade City—AIRPORT—City, airport grading, paving. $365,000. CAA will help finance.

Fla., Daytona Beach — AIRPORT — City, airport grading, paving, lighting. $238,900. CAA will help finance.

Fla., Deep Lake (Mail Everglades)—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., De Land—AIRPORT—City, airport lighting. $36,000. CAA will help finance.

Fla., East Cape—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., Ebro — AIRPORT — City, airport grading. $71,500. CAA will help finance.

Fla., Enstis — AIRPORT — City, airport grading. $156,350. CAA will help finance.

Fla., Everglades — AIRPORT — City, airport grading, paving, lighting, etc. $471,280. CAA will help finance.

Fla., Fernandina—AIRPORT—City, airport lighting. $36,000. CAA will help finance.

Fla., Fort Green Springs—AIRPORT—City, airport grading. $67,050. CAA will help finance.

Fla., Fort Lauderdale — AIRPORT — Broward Co., airport grading. $99,300. CAA will help finance.

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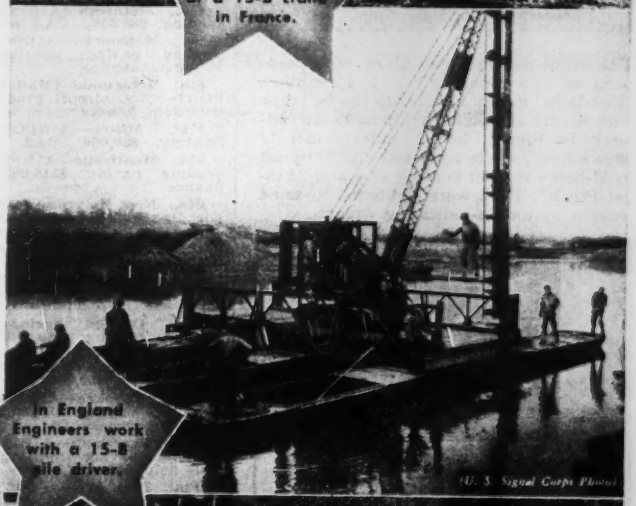
MEN who know their jobs and do them with outstanding effectiveness — this description fits not only our incomparable fighting men but equally the men who operate excavating equipment on the fighting fronts. Skilled in excavation, they give to their brothers in combat the help they need to win more quickly, playing superbly their positions on an invincible fighting team.

Of them and of the significance they have given to excavators in war, Bucyrus-Erie is proud. It is proud, too, that so many of the machines at the fingertips of these skilled men are speedy, smoothly-performing Bucyrus-Eries—as always, leaders in their field.

V-82

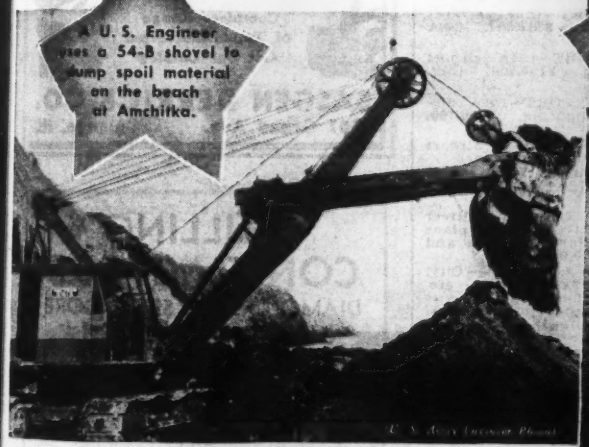
Ammunition carefully swung down with the accurate control of a 15-B crane in France.

(U. S. Signal Corps Photo)



In England Engineers work with a 15-B pile driver.

(U. S. Signal Corps Photo)



A U. S. Engineer uses a 54-B shovel to dump spoil material on the beach at Amchitka.

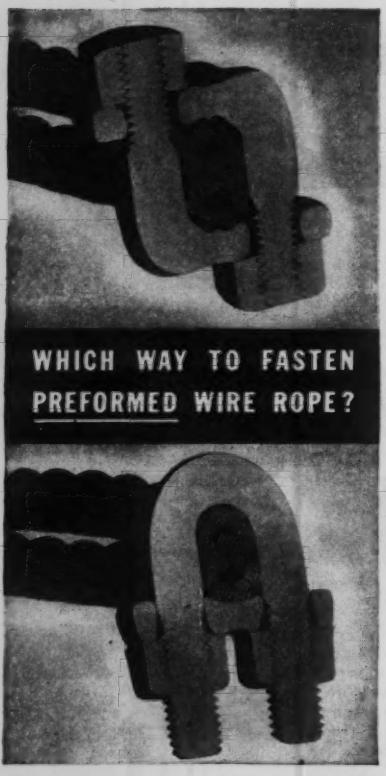
(U. S. Army Engineer Photo)

Gravel loading hurried in France with a speedy 15-B shovel

(U. S. Signal Corps Photo)

BUCYRUS ERIE

South Milwaukee, Wisconsin



The cross-section views show what happens to wire rope. In Fig. 1, Laughlin's "Fist-Grip" Safety Clip holds the 5/8" rope with hardly any distortion (note hemp centers). In Fig. 2, hemp center under U shows how rope is squeezed and flattened by U-bolt's smaller bearing area and "Finger-Pinch". Both were tightened to same tension by torque-indicating wrench.

Here's Why "Fist-Grip" Clips Work Better

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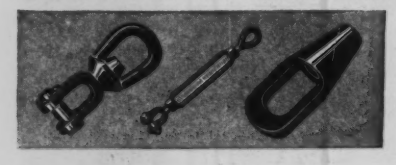


POSTWAR PROJECTS (Cont'd.)

Fla., Fort Myers—AIRPORT—City, airport grading, paving. $146,650. CAA will help finance.

Fla., Greenfield—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., Haines City—AIRPORT—City, airport grading. $156,350. CAA will help finance.

Fla., Havanna—AIRPORT—City, airport grading. $156,350. CAA will help finance.

Fla., High Springs—AIRPORT—City, airport grading. $156,350. CAA will help finance.

Fla., Holopaw—AIRPORT—City, airport grading. $50,000. CAA will help finance.

Fla., Hollywood—AIRPORT—City, airport grading. $319,000. CAA will help finance.

Fla., Hosford—AIRPORT—City, airport grading. $80,550. CAA will help finance.

Fla., Immokalee—AIRPORT—City, airport lighting. $30,000. CAA will help finance.

Fla., Indian Town—AIRPORT—City, airport grading. $88,050. CAA will help finance.

Fla., Inverness—AIRPORT—City, airport grading. $191,350. CAA will help finance.

Fla., Key West—AIRPORT—City, airport paving, lighting. $125,000. CAA will help finance.

Fla., Kissimmee—AIRPORT—Osceola Co., airport grading. $73,300. CAA will help finance.

Fla., La Belle—AIRPORT—City, airport grading, $173,850. CAA will help finance.

Fla., Lacota—AIRPORT—City, airport grading, $67,050. CAA will help finance.

Fla., Lake City—AIRPORT—City, airport grading, paving, $499,500. CAA will help finance.

Fla., Live Oak—AIRPORT—City, airport grading, paving, $365,000. CAA will help finance.

Fla., Madison—AIRPORT—City, airport grading, paving, lighting, $351,000. CAA will help finance.

Fla., Mayo — AIRPORT — City, airport grading, $65,000. CAA will help finance.

Fla., McIntosh—AIRPORT—City, airport grading, $80,550. CAA will help finance.

Fla., Melbourne—AIRPORT—City, airport grading, paving, lighting, $197,300. CAA will help finance.

Fla., Metacumbe (Mall Islamarada)—AIRPORT—City, airport grading, $91,050. CAA will help finance.

Fla., Milton—AIRPORT—City, airport lighting, $30,000. CAA will help finance.

Fla., Monticello—AIRPORT—City, airport grading, paving, $315,000. CAA will help finance.

Fla., New Smyrna—AIRPORT—City, airport lighting, $36,000. CAA will help finance.

Fla., Ocala — AIRPORT — City, airport grading, paving, lighting, $436,000. CAA will help finance.

Fla., Okeechobee—AIRPORT—City, airport grading, paving, lighting, etc. $107,600. CAA will help finance.

Fla., Orange Springs—AIRPORT—City, airport grading, $80,550. CAA will help finance.

Fla., Otter Creek—AIRPORT—City, airport grading, $50,000. CAA will help finance.

Fla., Pahokee—AIRPORT—City, airport grading, paving, lighting. $351,000. CAA will help finance.

Fla., Pensacola—AIRPORT—City, airport grading, paving, lighting. $492,700. CAA will help finance.

Fla., Port St. Joe—AIRPORT—City, airport grading, paving, lighting. $396,750. CAA will help finance.

Fla., Venus — AIRPORT — City, airport grading. $67,050. CAA will help finance.

Fla., Verna (Mall Myakka City)—AIRPORT—City, airport grading. $67,050. CAA will help finance.

Idaho — POWER LINES — Raft River Rural Electric Co-operative, Malta, plans 420 mi. power lines in Power, Oneida and Box Elder Counties. $400,000.

★**Idaho, Grangeville** — AIRPORT — City, airport grading, paving, lighting, etc. $584,000. CAA will help finance.

★**Idaho, Ketchum**—AIRPORT—City, airport grading, paving, lighting. $581,000. CAA will help finance.

Idaho, Pocatello—AIRPORT—City, airport grading, etc. $45,000. CAA will help finance.

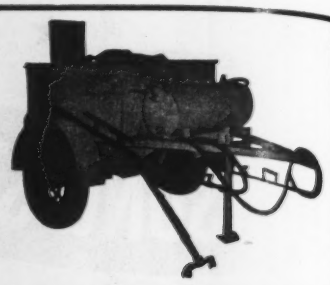
★**Ill., Arlington Heights**—AIRPORT—City, airport grading, paving, lighting, etc. $3,150,000. CAA will help finance.

★**Ill., Aurora** — AIRPORT — City, airport grading, paving, lighting, etc. $1,690,000. CAA will help finance.

★**Ill., Bellwood**—AIRPORT—City, airport grading, paving, lighting, etc. $3,150,000. CAA will help finance.

Ill., Belvidere — AIRPORT — City, airport grading, etc. $25,000. CAA will help finance.

★**Ill., Berwyn** — AIRPORT — City, airport grading, paving, lighting, etc. $1,690,000. CAA will help finance.



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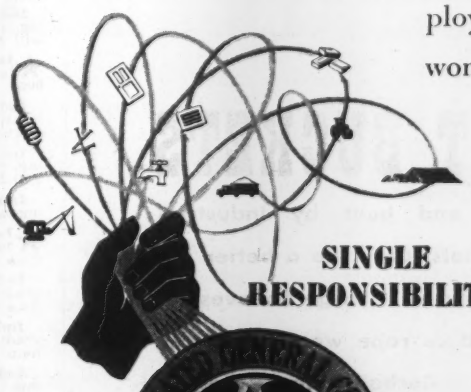

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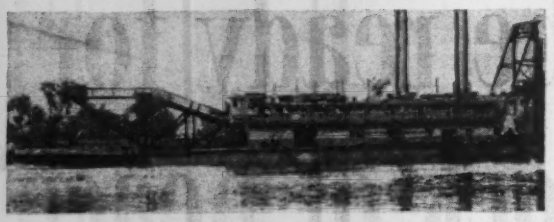

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POSTWAR PROJECTS (Cont'd.)

★**Ill., Bloomington**—AIRPORT—City, airport grading, paving, lighting, etc. $730,000. CAA will help finance.

★**Ill., Blue Island**—AIRPORT—City, airport grading, paving, lighting, etc. $1,690,000. CAA will help finance.

★**Ill., Brookfield**—AIRPORT—City, airport grading, paving, lighting, etc. $935,000. CAA will help finance.

★**Ill., Calumet City**—AIRPORT—City, airport grading, paving, lighting, etc. $955,000. CAA will help finance.

★**Ill., Chicago**—AIRPORT—City, airport grading, paving, lighting, etc. $3,150,000. CAA will help finance.

★**Ill., Chicago Heights**—AIRPORT—City, airport grading, paving, lighting, etc. $980,000. CAA will help finance.

★**Ill., Danville**—AIRPORT—City, airport grading, paving, lighting, etc. $730,000. CAA will help finance.

★**Ill., Des Plaines**—AIRPORT—City, airport grading, paving, lighting, etc. $955,000. CAA will help finance.

★**Ill., East St. Louis**—AIRPORT—City, airport grading, paving, lighting, etc. $1,165,000. CAA will help finance.

Ill., Effingham—AIRPORT—City, airport grading, paving, lighting, etc. $365,000. CAA will help finance.

★**Ill., Elgin** — AIRPORT — City, airport grading, paving, lighting, etc. $955,000. CAA will help finance.

Ill., Joliet—AIRPORT—City, airport grading, paving, lighting, etc. $365,000. CAA will help finance.

Ill., Jonesboro — AIRPORT — City, airport grading, lighting, etc. $64,000. CAA will help finance.

★**Ill., Kankakee**—AIRPORT—City, airport grading, paving, lighting, etc. $1,165,000. CAA will help finance.

★**Ill., LaSalle**—AIRPORT—City, airport grading, paving, lighting, etc. $730,000. CAA will help finance.

★**Ill., Marion**—AIRPORT—City, airport grading, paving, lighting, etc. $730,000. CAA will help finance.

★**Ill., Rockford**—AIRPORT—City, airport grading, paving, lighting, etc. $1,165,000. CAA will help finance.

★**Ill., Waukegan** — AIRPORT — City, airport grading, paving, lighting, etc. $955,000. CAA will help finance.

Ind., Evansville—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ind., Fort Wayne—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

★**Ind., Gary**—AIRPORT—City, plans grading, paving, lighting airport. $1,390,000. CAA will help finance.

Ind., Goshen—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Greencastle—AIRPORT—City, grading, paving, lighting airport. $365,000. CAA will help finance. CD 8/25—ENR 9/7.

Ind., Greensburg—AIRPORT—City, grading, airport. $25,000. CAA will help finance.

★**Ind., Hammond**—AIRPORT—City, grading, paving, lighting airport. $730,000. CAA will help finance.

Ind., Hartford City—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ind., Huntingburg — AIRPORT — City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Huntington—AIRPORT—City, grading, paving, lighting. $304,000. CAA will finance.

Ind., Jasonville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ind., Jeffersonville—AIRPORT—City, grading, airport. $25,000. CAA will help finance.

Ind., Knightstown—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

★**Ind., Lafayette**—AIRPORT—City, grading, paving, lighting airport. $730,000. CAA will help finance.

Ind., LaGrange—AIRPORT—City, grading, lighting, airport. $40,000. CAA will help finance.

Ind., Lawrenceburg — AIRPORT — City, grading, paving, lighting airport. $365,000. CAA will help finance.

Ind., Lebanon—AIRPORT—City, grading, paving, lighting airport. $64,000. CAA will help finance.

Ind., Linton—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

★**Ind., Logansport**—AIRPORT—City, grading, paving, lighting airport. $730,000. CAA will help finance.

Ind., Loogootee—AIRPORT—City, grading airport. $25,000. CAA will help finance.

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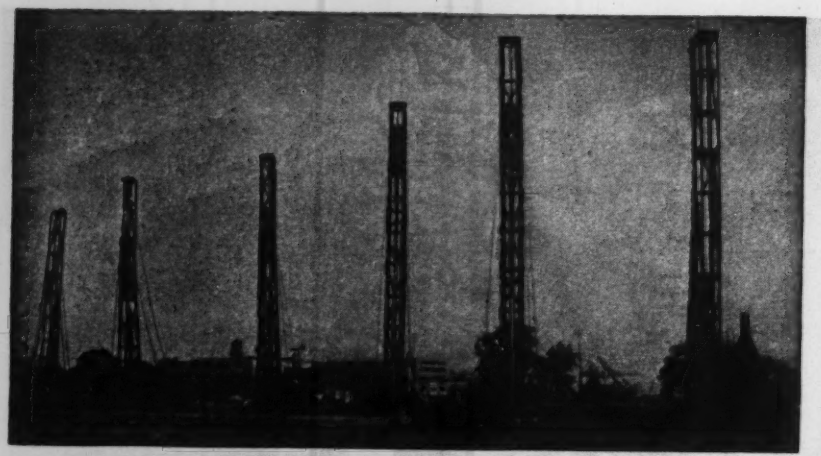

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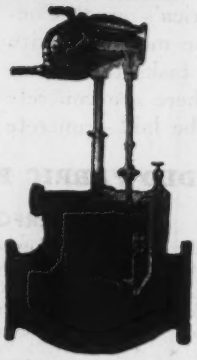

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POSTWAR PROJECTS (Cont'd.)

Ind., Marion—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ind., Martinsville—AIRPORT—City, grading, lighting airport. $40,000. CAA will help finance.

★ **Ind., Michigan City**—AIRPORT—City, grading, paving, lighting airport. $953,000. CAA will help finance.

Ind., Mitchell—AIRPORT—City, grading, lighting airport. $25,000. CAA will help finance.

Ind., Monticello—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ind., Mount Vernon—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

★ **Ind., Muncie**—AIRPORT—City, grading, lighting airport, for Tri-city. $853,000. CAA will finance.

Ind., Nappanee—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ind., New Albany—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ind., Noblesville—AIRPORT—City, grading, lighting airport. $64,000. CAA will finance.

Ind., North Manchester—AIRPORT—City, grading, lighting, airport. $40,000. CAA will help finance.

Ind., Petersburg—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ind., Plymouth—AIRPORT—City, grading, lighting. $64,000. CAA will help finance.

Ind., Portland—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Princeton—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Rochester—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Rockport—AIRPORT—City, grading, lighting airport. $25,000. CAA will help finance.

Ind., Rockville—AIRPORT—City, grading, lighting airport. $25,000. CAA will help finance.

Ind., Rushville—AIRPORT—City, grading, lighting airport. $40,000. CAA will help finance.

Ind., Salem—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

★ **Ind., South Bend** — AIRPORT — City, grading, paving, lighting airport. $1,165,000. CAA will help finance.

★ **Ind., Vincennes**—AIRPORT—City, grading, paving, lighting airport. $730,000. CAA will help finance.

Ind., Wabash—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ind., Warsaw—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

★ **Ia., Ames** — AIRPORT — City, grading, paving, lighting airport. $624,000. CAA will help finance. CD 5/4—ENR 5/18.

★ **Ia., Clinton**—AIRPORT—City grading, paving, lighting airport. $594,000. CAA will help finance. CD 11/30—ENR 12/14/44.

Ia., Decorah—AIRPORT—City, grading, lighting airport. $124,500. CAA will help finance.

★ **Ia., Keokuk**—AIRPORT—City, grading, paving, lighting airport. $629,000. CAA will help finance.

Ia., Sioux City—AIRPORT—City, grading airport. $34,000. CAA will help finance.

Kan., Chanute—AIRPORT—City, grading, paving, lighting airport. $190,000. CAA will help finance.

Kan., Clay Center—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Coffeyville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Kan., Colby—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Concordia—AIRPORT—City, grading, lighting airport. $75,000. CAA will help finance.

Kan., Dodge City—AIRPORT—City, grading, lighting airport. $142,000. CAA will help finance.

Kan., Eureka—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Fort Scott—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Garden City—AIRPORT—City, grading, paving, lighting airport. $31,000. CAA will help finance.

Kan., Garnett—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Girard—AIRPORT—City, grading airport. $26,000. CAA will help finance.

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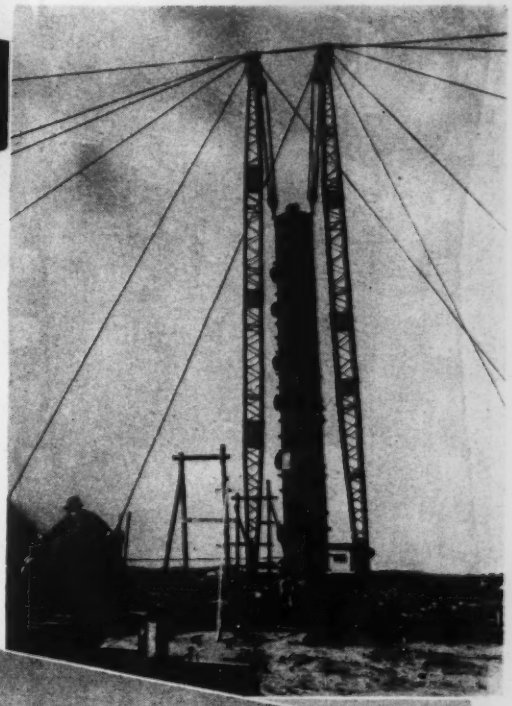

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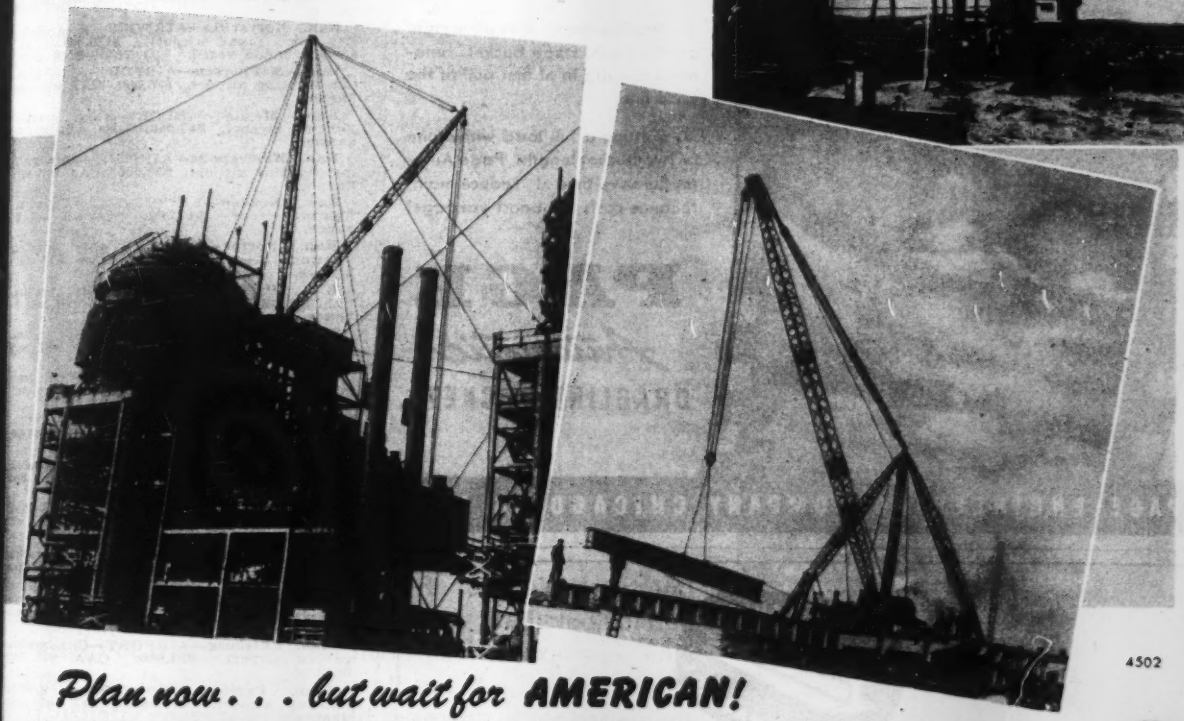

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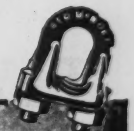

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POSTWAR PROJECTS (Cont'd.)

Kan., Goodland—AIRPORT—City, grading, paving, lighting airport. $57,000. CAA will help finance.

Kan., Greensburg—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Hayes—AIRPORT—City, grading, lighting airport. $73,000. CAA will finance.

Kan., Hiawatha—AIRPORT—City, grading airport. $27,000. CAA will help finance.

Kan., Holton—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Horton—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Hutchinson—AIRPORT—City, grading, paving, lighting airport. $97,000. CAA will help finance.

Kan., Independence — AIRPORT — City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Iola — AIRPORT — City, grading, lighting airport. $34,000. CAA will help finance.

Kan., Junction City — AIRPORT — City, grading, lighting airport. $26,000. CAA will help finance.

Kan., Kansas City—AIRPORT—City, grading, lighting airport $113,000; grading airport $27,000. CAA will help finance.

Kan., Kingman—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Kinsley—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Lawrence—AIRPORT—City, grading, paving, lighting airport. 107,000. CAA will help finance.

Kan., Leavenworth — AIRPORT — City, grading, paving, lighting airport. $173,000. CAA will help finance.

Kan., Marion—AIRPORT—City, grading, paving, lighting airport. $388,000. CAA will help finance.

Kan., Marion—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Marysville—AIRPORT—H. A. Hohn city clk., plans airport. $135,000. CAA $50,000 bonds voted. CD 11/5—ENR 11/11

Kan., McPherson—AIRPORT—City, grading, lighting airport. $36,000. CAA will help finance.

Kan., Meade—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Minneapolis—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Newton—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Norton—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Oakley—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Olathe—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Osage City—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Osawatomie-Paola — AIRPORT — Cities, grading, lighting airport. $73,000. CAA will help finance.

Kan., Ottawa—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Park-Grainfield—AIRPORT—Cities, grading, lighting airport. $73,000. CAA will help finance.

Kan., Parsons—AIRPORT—City, grading, lighting airport. $51,000. CAA will help finance.

Kan., Phillipsburg—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

Kan., Pittsburg—AIRPORT—City, grading, paving airport. $91,000. CAA will help finance.

Kan., Pratt—AIRPORT—City, grading, lighting airport. $47,000. CAA will help finance.

Kan., Russell—AIRPORT—City, grading, lighting airport. $51,000. CAA will help finance.

Kan., Sabetha—AIRPORT—City, grading, airport. $28,000. CAA will help finance.

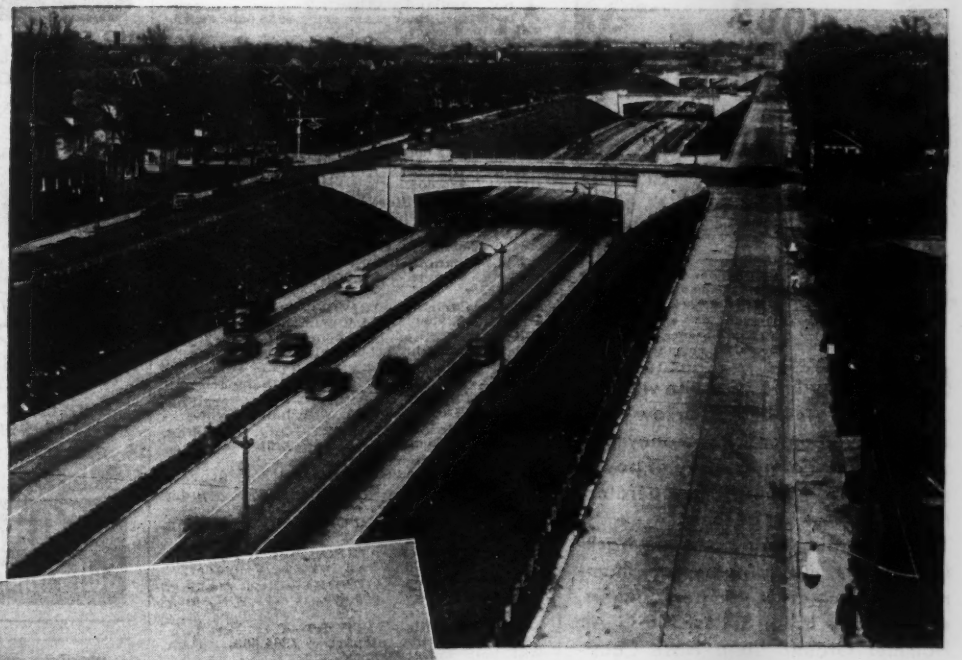
Kan., Salina—AIRPORT—City, grading, paving, lighting airport. $446,000. CAA will help finance.

Kan., Scott City—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

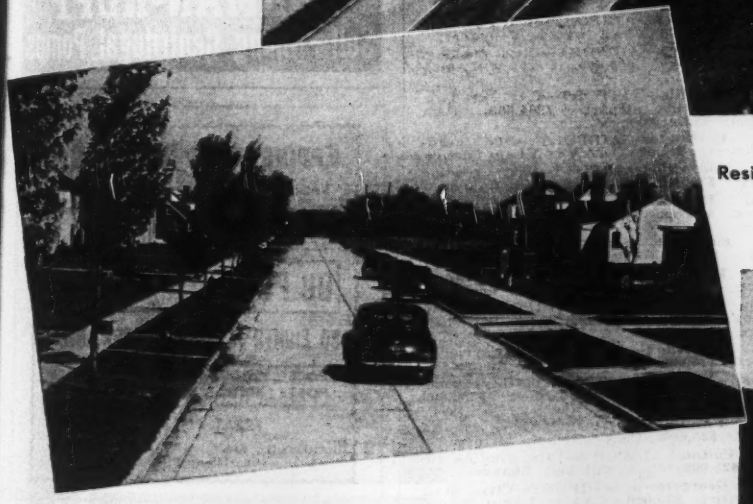
Kan., Sedan—AIRPORT—City, grading airport. $27,000. CAA will help finance.

Kan., Seneca—AIRPORT—City, grading, lighting airport. $73,000. CAA will help finance.

CONCRETE *the low annual cost pavement*



Davison Limited Access Highway, Detroit. *10-in. uniform cross section.*



Residence street in Saginaw, Michigan. *7½-5-7½ in. cross section.*

State highway in Oklahoma carrying moderately heavy rural traffic. *9-6-9 in. cross section.*

Accurate formulas enable engineers to design portland cement concrete pavements to carry any predicted volume and weight of traffic at lowest maintenance expense. This plus the fact that concrete, for all but the lightest traffic roads, usually costs less to build than any other pavement of equal load-carrying capacity, means low annual cost, the true measure of pavement economy.

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POSTWAR PROJECTS (Cont'd.)

Kan., Topeka—AIRPORT—City, grading, paving, lighting airport. **$296,000.** CAA will help finance.

Kan., Wakeeny—AIRPORT—City, grading, lighting airport. **$73,000.** CAA will help finance.

Kan., Wellington—AIRPORT—City, grading, lighting airport. **$73,000.** CAA will help finance.

Kan., Wichita—AIRPORT—City, grading airport. **$29,000.** CAA will help finance.

Kan., Yates Center — AIRPORT — City, grading, lighting airport. **$73,000.** CAA will help finance.

★**Ky., Ashland**—AIRPORT—City, grading, paving, lighting airport. **$955,000.** CAA will help finance.

Ky., Augusta—AIRPORT—City, grading, airport. **$25,000.** CAA will help finance.

Ky., Bardstown—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Beattyville—AIRPORT—City, grading airport. **$25,000.**

Ky., Benton—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Berea—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Burkesville—AIRPORT—City, grading airport. **$25,000.**

Ky., Cadiz—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Campbellsville — AIRPORT — City, grading airport. **$25,000.** CAA will help finance.

Ky., Carlisle—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Carrollton—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Central City—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Chaplin—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Clinton—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Cloverport—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Columbia—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Corbin—AIRPORT—City, grading airport. **$64,000.** CAA will help finance.

Ky., Covington—AIRPORT—City, grading airport. **$30,000.** CAA will help finance.

Ky., Cythiana—AIRPORT—City, grading, lighting airport. **$64,000.** CAA will help finance.

Ky., Danville—AIRPORT—City, grading, paving, lighting airport. **$304,000.** CAA will help finance.

Ky., Earlington—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Eddyville—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Elizabethtown — AIRPORT — City, grading, airport. **$25,000.** CAA will help finance.

Ky., Falmouth—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Fiskburg—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Flemingsburg — AIRPORT — City, grading airport. **$25,000.** CAA will help finance.

Ky., Fort Knox—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

★**Ky., Frankfort**—AIRPORT—City, grading, paving, lighting airport. **$730,000.** CAA will help finance.

Ky., Franklin—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Fulton—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Georgetown—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Glasgow—AIRPORT—City, grading, lighting airport. **$64,000.** CAA will help finance.

Ky., Guthrie — AIRPORT — City, grading airport. **$25,000.** CAA will help finance.

Ky., Harlan — AIRPORT — City, grading, paving airport. **$304,000.** CAA will help finance.

Ky., Harrodsburg—AIRPORT—City, grading, lighting airport. **$64,000.** CAA will help finance.

Ky., Hartford—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Hazard — AIRPORT — City, grading, paving, lighting airport. **$304,000.** CAA will help finance.

Ky., Hellier — AIRPORT — City, grading airport. **$25,000.** CAA will help finance.

Ky., Henderson—AIRPORT—City, grading, lighting airport. **$64,000.** CAA will help finance.

Ky., Hickman—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

Ky., Hopkinsville—AIRPORT—City, grading, paving, lighting airport. **$304,000.** CAA will help finance.

Ky., Irvine—AIRPORT—City, grading airport. **$25,000.** CAA will help finance.

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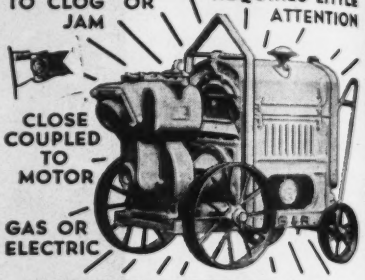

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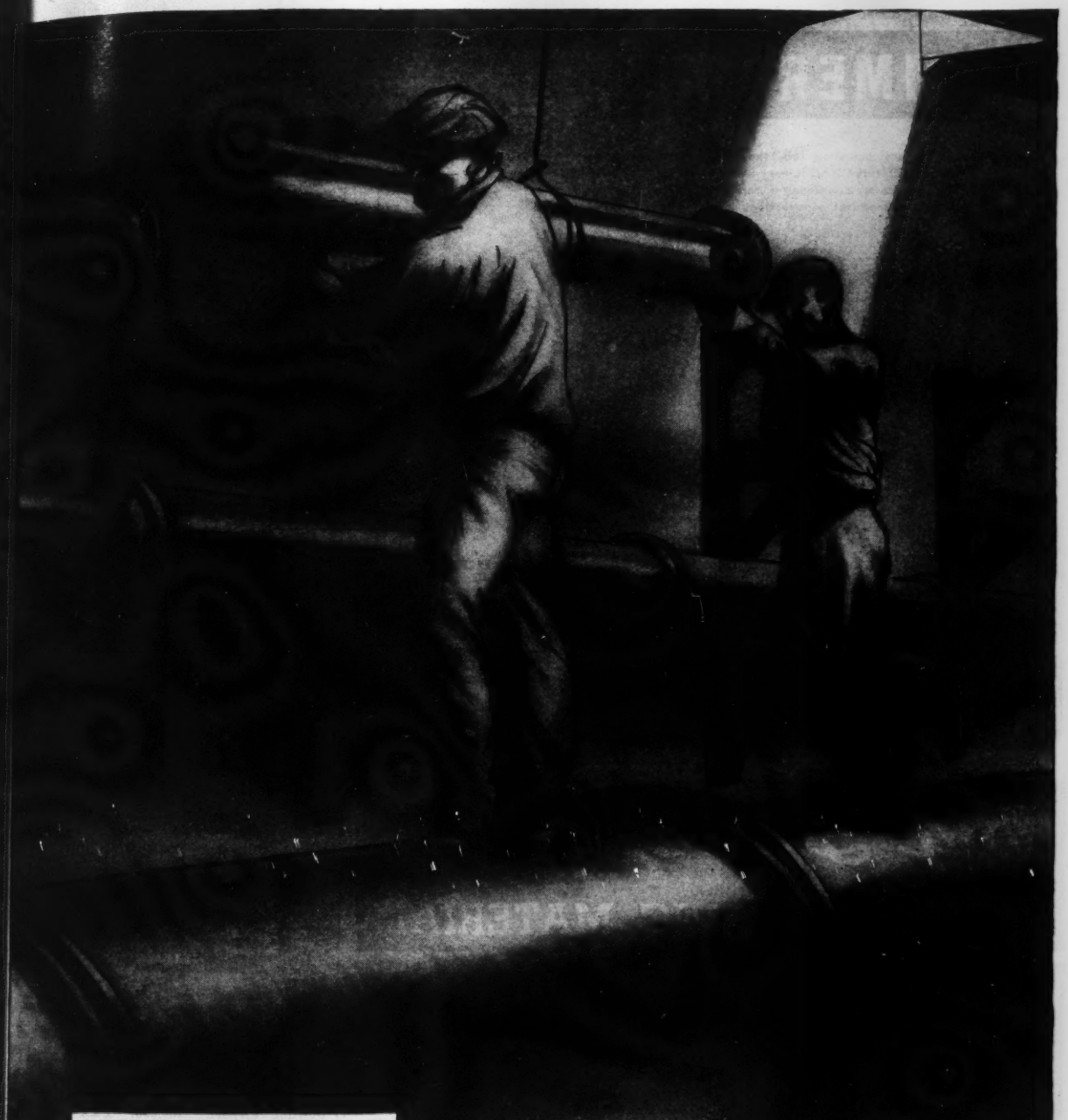

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POSTWAR PROJECTS (Cont'd.)

Ky., Jackson — AIRPORT — City, grading airport. $25,000. CAA will help finance.

Ky., Jenkins — AIRPORT — City, grading airport. $25,000. CAA will help finance.

Ky., LaGrange—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Lawrenceburg — AIRPORT — City, grading airport. $25,000. CAA will help finance.

Ky., Lebanon—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Livermore—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., London—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Louisa—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Louisville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Lynch—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Madisonville—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ky., Marion—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Mayfield—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ky., Maysville—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ky., McDaniels—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., McVeigh—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Middlesboro—AIRPORT—City, grading, lighting, paving, airport. $304,000. CAA will help finance.

Ky., Monticello—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Morehead—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Morganfield—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Mount Sterling — AIRPORT — City, grading airport. $64,000. CAA will help finance.

Ky., Murray—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Newport—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Nicholasville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Olive Hill—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Owensboro—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ky., Paintsville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Paris—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ky., Pikesville—AIRPORT—City, grading, paving airport. $304,000. CAA will help finance.

Ky., Prestonburg—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Princeton—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ky., Providence—AIRPORT—City, grading, lighting airport. $40,000. CAA will help finance.

Ky., Richmond—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ky., Russellville—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Ky., Scottsville—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Ky., Shelbyville—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Ky., Smiths Grove—AIRPORT—City, grading airport. $25,000. CAA will help finance.

★**La., Abbeville**—AIRPORT—City, grading, paving, lighting airport. $754,470. CAA will help finance.

★**La., Alexandria**—AIRPORTS—City, grading, paving, lighting airport, $104,110; paving, grading airport, $150,700; grading, paving, lighting airport, $683,400. CAA will help finance. CD 8/16—ENR 9/7.

La., Amite — AIRPORT — City, grading, paving, lighting airport. $156,750. CAA will help finance.

La., Arcadia—AIRPORT—City, grading, paving, lighting airport. $189,450. CAA will help finance.

★**La., Bastrop**—AIRPORT—City, grading, paving, lighting airport. $698,823. CAA will help finance.

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Throughout the country, thousands of plants like this one have been getting years of satisfaction from "Century" Asbestos Corrugated and Flat Lumber. There must be good reason for this . . . in fact, there are six. Here are the special features of "Century" Asbestos Corrugated and Flat Lumber:

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POSTWAR PROJECTS (Cont'd.)

★**La., Baton Rouge** — AIRPORTS — City, grading, paving, lighting airport, $807,910; airport, $502,510; airport, $78,400. CAA will help finance.

★**La., Bogalusa**—AIRPORT—City, grading, paving, lighting airport, $136,810; airport, $1,145,130. CAA will help finance.

★**La., Bossier (br. Shreveport)**—AIRPORT—City, grading, paving, lighting airport, $715,090. CAA will help finance.

★**La., Bunkie**—AIRPORT—City, grading, paving, lighting airport. $612,460. CAA will help finance.

★**La., Burns** — AIRPORT — City, grading, paving, lighting airport. $741,520. CAA will help finance.

La., Cameron—AIRPORT—City, grading, paving, lighting airport. $219,934. CAA will help finance.

La., Colfax — AIRPORT — City, grading, paving, lighting airport. $134,500. CAA will help finance.

★**La., Columbia**—AIRPORT—City, grading, paving, lighting airport. $643,620. CAA will help finance.

La., Coushatta—AIRPORT—City, grading, paving, lighting airport. $143,530. CAA will help finance.

★**La., Covington**—AIRPORT—City, grading, paving, lighting airport. $851,740. CAA will help finance.

La., Crowley—AIRPORTS—City, grading, paving, lighting airport, $401,060; airport $72,670. CAA will help finance.

La., DeQuincy—AIRPORT—City, grading, paving, lighting airport. $117,630. CAA will help finance.

La., DeRidder—AIRPORT—City, grading, paving airport. $98,120. CAA will help finance.

★**La., Donaldsonville** — AIRPORT — City, grading, paving, lighting airport. $1,082,420. CAA will help finance.

La., Elizabeth—AIRPORT—City, grading, paving, lighting airport. $125,910. CAA will help finance.

★**La., Eunice**—AIRPORT—City, grading, paving, lighting airport. $588,410. CAA will help finance.

La., Farmerville—AIRPORT—City, grading, paving, lighting airport. $133,760. CAA will help finance.

La., Ferriday—AIRPORT—City, grading, paving, lighting airport. $75,730. CAA will help finance.

La., Franklin—AIRPORT—City, grading, paving, lighting airport. $258,020. CAA will help finance.

La., Franklinton—AIRPORT—City, grading, paving, lighting airport. $169,950. CAA will help finance.

La., Grand Chenier — AIRPORT — City, grading, paving, lighting airport. $217,970. CAA will help finance.

★**La., Grand Isle**—AIRPORT—City, grading, paving, lighting airport. $769,584. CAA will help finance.

La., Gueydan—AIRPORT—City, grading, paving, lighting airport. $97,394. CAA will help finance.

La., Hammond—AIRPORT—City, grading, paving, lighting airport. $97,394. CAA will help finance.

La., Haynesville—AIRPORT—City, grading, paving, lighting airport. $137,110. CAA will help finance.

La., Homer—AIRPORT—City, grading, paving, lighting airport. $113,810. CAA will help finance.

★**La., Houma**—AIRPORT—City, grading, paving, lighting airport. $515,440. CAA will help finance.

★**La., Jackson**—AIRPORT—City, grading, paving, lighting airport. $896,110. CAA will help finance.

La., Jeanerette—AIRPORT—City, grading, paving, lighting airport. $187,300. CAA will help finance.

La., Jena-Good Pine—AIRPORT—Cities, grading, paving, lighting airport. $102,020. CAA will help finance.

★**La., Jonesboro-Hodge**—AIRPORT—Cities, grading, paving, lighting airport. $738,453. CAA will help finance.

★**La., Jonesville**—AIRPORT—City, grading, paving, lighting airport. $807,829. CAA will help finance.

La., Kinder—AIRPORT—City, grading, paving, lighting airport. $74,340. CAA will help finance.

★**La., Lafayette**—AIRPORTS—City, grading, paving, lighting airport $686,820; airport $80,680. CAA will help finance.

La., Lake Arthur—AIRPORT—City, grading, paving airport. $176,440. CAA will help finance.

La., Lake Charles—AIRPORTS—City, paving, lighting, grading airport. $88,930; grading, paving airport $50,980. CAA will help finance.

★**La., Lake Providence**—AIRPORT—City, plans grading, paving, lighting airport. $632,995. CAA will help finance.

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Normally, the retreating Nazis could count on a considerable margin of time, until Allied engineers established bridges substantial enough for communications and supply lines. But not in *this* war!

On the double, the engineers set up steel trusses in ten-foot sections, each easily handled by six men. These interchangeable steel members are quickly fastened together by pins, rather than by bolts or rivets. In almost no time at all, a bridge has risen on rollers on the river bank—and with a heave-ho the engineers push it out across the water. Soon vehicles and men are rumbling across.

Such is the Bailey Bridge, designed by Donald C. Bailey of the British Ministry of Supply. (Mr. Bailey's plan, when accepted, was just a sketch on the back of an envelope.) Successfully used in Tunisia, Sicily and Italy, the Bailey Bridge has long been standard British and U. S. Army equipment, although its story could not be told until recently.

In various combinations of trusses the bridge serves many purposes. Three tiers high, it carries light railway loads. Clear spans are possible up to 240 feet. Short spans have been thrown across streams in as little time as half an hour—which explains the bridge's role in the swift Allied advance through France.

Many Bailey Bridges, now in use in Europe, were fabricated from Mayari R,* Bethlehem's low-alloy weight-saving, high-strength steel. It's an ideal steel for the purpose, and it will be ideal for postwar uses—bridges, industrial and mining equipment, railway stock, truck and bus bodies, building and shipbuilding members, and literally hundreds of others—where great strength, reduction of dead weight, workability, superior welding qualities and resistance to corrosion are factors.

If you would like to have all the facts about Mayari R, which is available in sheets, strips, shapes, plates and bars, write to Bethlehem Steel Company, Bethlehem, Pa., for booklet telling the complete story of this remarkable steel.

★ ★ BETHLEHEM STEEL ★ ★

**Named for the Cuban mines where natural ore was found containing the iron and alloying elements of Mayari. The "R" stands for "Rust Resisting."*

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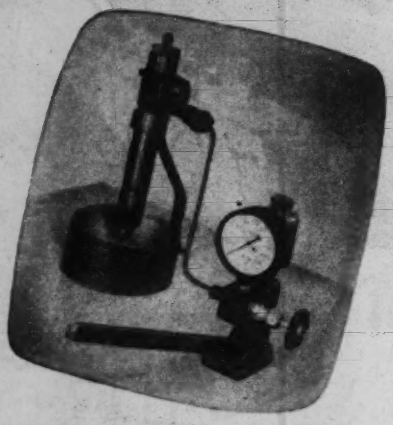

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POSTWAR PROJECTS (Cont'd.)

★**La., Leesville**—AIRPORT—City, grading, paving, lighting airport. **$781,250.** CAA will help finance.

★**La., Mansfield**—AIRPORT—City, grading, paving, lighting airport. **$522,940.** CAA will help finance.

La., Many — AIRPORT — City, grading, paving, lighting airport. **$109,940.** CAA will help finance.

La., Marksville—AIRPORT—City, grading, paving, lighting airport. **$137,150.** CAA will help finance.

★**La., Melville**—AIRPORT—City, grading, paving, lighting airport. **$673,050.** CAA will help finance.

★**La., Minden**—AIRPORT—City, grading, paving, lighting airport. **$735,119.** CAA will help finance.

★**La., Monroe**—AIRPORTS—City, grading, paving, lighting airport **$849,255;** airport **$97,710.** CAA will help finance.

★**La., Morgan City** — AIRPORT — City, grading, paving, lighting airport. **$1,078,360.** CAA will help finance.

★**La., Natchitoches** — AIRPORT — City, grading, paving, lighting airport. **$540,950.** CAA will help finance.

★**La., New Iberia**—AIRPORT—City, grading, paving, lighting airport. **$515,590.** CAA will help finance.

★**La., New Orleans** — AIRPORTS — City, grading, paving, lighting airport, **$142,940;** airport **$141,410;** airport **$141,150;** airport, **$161,249;** airport **$251,770;** airport **$215,790;** airport **$574,030;** airport **$1,874,580;** grading, paving airport **$50,740.** CD 9/8—ENR 9/21.

La., New Roads—AIRPORT—City, grading, paving, lighting airport. **$93,990.** CAA will help finance.

★**La., Oakdale**—AIRPORT—City, grading, paving, lighting airport. **$747,769.** CAA will help finance.

La., Opelousas—AIRPORT—City, grading, paving, lighting airport. **$322,090.** CAA will help finance.

★**La., Patterson**—AIRPORT—City, grading, paving, lighting airport. **$917,430.** CAA will help finance.

★**La., Plaquemine**—AIRPORT—City, grading, paving, lighting airport. **$820,193.** CAA will help finance.

La., Pointe ala Hache—AIRPORT—City, grading, paving, lighting airport. **$228,019.** CAA will help finance.

La., Ponchatoula—AIRPORT—City, grading, paving, lighting airport. **$115,753.** CAA will help finance.

La., Rayne—AIRPORT—City, grading, paving, lighting airport. **$80,350.** CAA will help finance.

La., Rayville—AIRPORT—City, grading, paving, lighting airport. **$99,160.** CAA will help finance.

La., Reserve—AIRPORT—City, grading, paving, lighting airport. **$216,218.** CAA will help finance.

La., Ringgold—AIRPORT—City, grading, paving, lighting airport. **$101,360.** CAA will help finance.

★**La., Ruston**—AIRPORT—City, grading, paving, lighting airport. **$1,355,420.** CAA will help finance.

★**La., Shreveport**—AIRPORTS—City, grading, paving, lighting airport, **$1,320,803;** airport **$82,115;** airport **$572,830.** CAA will help finance.

La., Simmsport—AIRPORT—City, grading, paving, lighting airport. **$189,530.** CAA will help finance.

La., Slidell — AIRPORT — City, grading, paving, lighting airport **$114,800.** CAA will help finance.

La., Springhill—AIRPORT—City, grading, paving, lighting airport. **$104,110.** CAA will help finance.

La., St. Joseph—AIRPORT—City, grading, paving, lighting airport. **$81,450.** CAA will help finance.

La., St. Martinville — AIRPORT — City, grading, paving, lighting airport. **$85,195.** CAA will help finance.

La., Sulphur—AIRPORT—City, grading, paving, lighting airport. **$90,453.** CAA will help finance.

★**La., Tallulah**—AIRPORT—City, grading, paving, lighting airport. **$697,851.** CAA will help finance.

★**La., Thibodaux**—AIRPORT—City, grading, paving, lighting airport. **$856,370.** CAA will help finance.

★**La., Ville Platte**—AIRPORT—City, grading, paving, lighting airport. **$773,355.** CAA will help finance.

★**La., Vivian**—AIRPORT—City, grading, paving, lighting airport. **$693,959.** CAA will help finance.

★**La., Winfield**—AIRPORT—City, grading, paving, lighting airport. **$761,255.** CAA will help finance.

La., Winnsboro—AIRPORT—City, grading, paving, lighting airport. **$99,605.** CAA will help finance.

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Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

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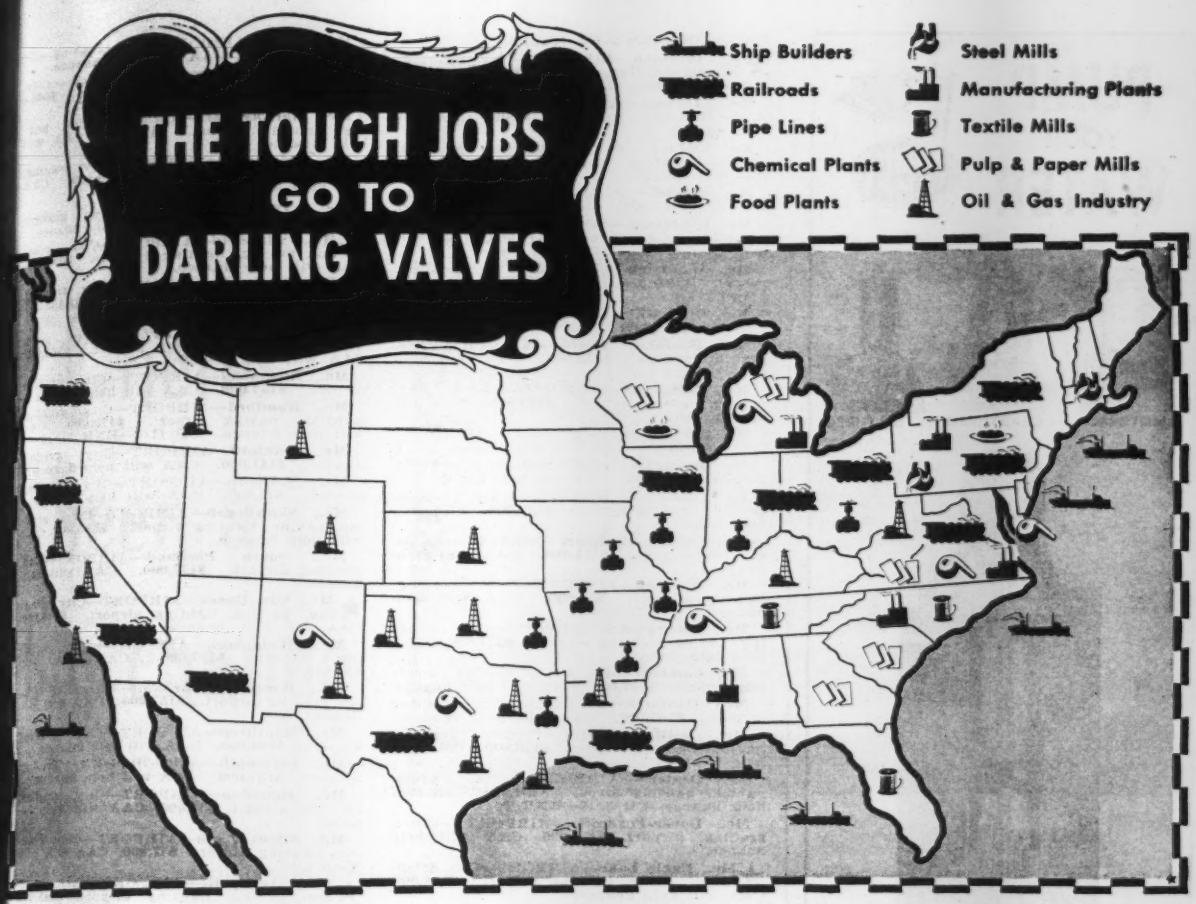

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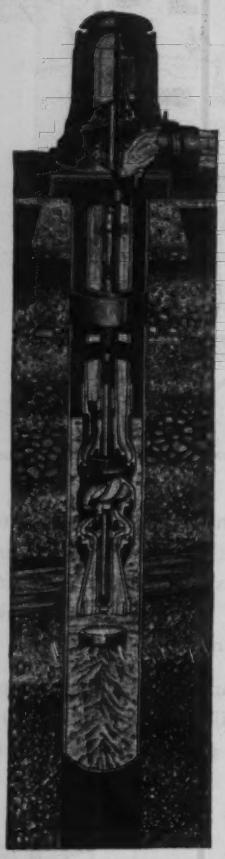

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POSTWAR PROJECTS (Cont'd.)

★**Me., Ashland**—AIRPORT—City, grading, paving, lighting airport. **$525,000.** CAA will help finance.

Me., Augusta—AIRPORT—City, grading, paving, lighting airport. **$274,000.** CAA will help finance.

Me., Belfast — AIRPORT — City, grading, paving, lighting airport. **$70,000.** CAA will help finance.

Me., Bethel — AIRPORT — City, grading airport. **$157,000.** CAA will help finance.

Me., Biddeford—AIRPORT—City, grading, paving, lighting airport. **$411,000.** CAA will help finance.

Me., Bingham—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Me., Blue Hill—AIRPORT—City, grading, airport. **$158,000.** CAA will help finance.

Me., Boothbay Harbor—AIRPORT—City, grading airport. **$258,000.** CAA will help finance.

Me., Bridgeton—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Me., Bristol—AIRPORT—City, grading airport. **$193,000.** CAA will help finance.

Me., Bucksport—AIRPORT—City, grading airport. **$213,000.** CAA will help finance.

Me., Calais — AIRPORT — City, grading, paving, lighting airport. **$429,000.** CAA will help finance.

Me., Camden-Rockport—AIRPORT—Cities, grading airport. **$157,000.** CAA will help finance.

Me., Caribou—AIRPORT—City, grading, lighting airport. **$30,000.** CAA will help finance,

Me., Cherryfeild—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Me., Cumberland—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., Danforth—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., DeBlois—AIRPORT—City, grading, paving, lighting airport. **$176,000.** CAA will help finance.

Me., Dexter — AIRPORT — City, grading, paving, lighting airport. **$231,000.** CAA will help finance. CD 9/12—ENR 9/21.

Me., Dover-Foxcroft — AIRPORT — Cities, grading, airport. **$157,000.** CAA will help finance.

★**Me., Eagle Lake**—AIRPORT—City, grading, paving, lighting airport. **$554,000.** CAA will help finance.

Me., Eastport—AIRPORT—City, grading, paving, lighting airport. **$213,000.** CAA will help finance.

Me., Ellsworth—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., Farmington—AIRPORT—City, grading, paving, lighting airport. **$449,000.** CAA will help finance.

Me., Fort Fairfield — AIRPORT — City, grading airport. **$166,000.** CAA will help finance.

★**Me., Fort Kent**—AIRPORT—City, grading, paving, lighting airport. **$508,000.** CAA will help finance.

Me., Freeport—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., Gardner—AIRPORT—City, grading airport. **$169,000.** CAA will help finance.

Me., Greenville—AIRPORT—City, grading, paving, lighting airport. **$318,000.** CAA will help finance.

★**Me., Hollis** — AIRPORT — City, grading, paving, lighting airport. **$960,000.** CAA will help finance.

Me., Jackman—AIRPORT—City, grading, paving, lighting airport. **$489,000.** CAA will help finance.

Me., Kennebunk—AIRPORT—City, grading, airport. **$157,000.** CAA will help finance.

Me., Kittery — AIRPORT — City, grading, paving, lighting airport. **$406,000.** CAA will help finance.

Me., Lincoln—AIRPORT—City, grading, paving, lighting airport. **$469,000.** CAA will help finance.

Me., Lisbon — AIRPORT — City, grading, airport. **$157,000.** CAA will help finance.

Me., Livermore Falls—AIRPORT—City, grading, airport. **$258,000.** CAA will help finance.

Me., Machias—AIRPORT—City, grading, paving, lighting airport. **$464,000.** CAA will help finance.

Me., Madawaska—AIRPORT—City, grading, etc. airport. **$157,000.** CAA will help finance.

Me., Madison—AIRPORT—City, grading airport. **$130,000.** CAA will help finance.

Me., Mars Hill—AIRPORT—City, grading airport. **$169,000.** CAA will help finance.

★**Me., Millinocket**—AIRPORT—City, grading, paving, lighting airport. **$637,000.** CAA will help finance.

Me., Milo—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., Minot—AIRPORT—City, grading airport. **$134,000.** CAA will help finance.

★**Me., Norridgewock** — AIRPORT — City, grading, paving, lighting airport. **$608,000.** CAA will help finance.

Me., Norway-Paris—Cities, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Me., Old Town—AIRPORT—City, grading, paving, lighting airport. **$249,000.** CAA will help finance.

Me., Patten—AIRPORT—City, grading airport. **$169,000.** CAA will help finance.

★**Me., Pittsfield**—AIRPORT—City, grading, paving, lighting airport. **$551,000.** CAA will help finance.

★**Me., Portland**—AIRPORT—City, grading, paving, lighting airport. **$1,132,000.** CAA will help finance.

★**Me., Rangeley**—AIRPORT—City, grading, paving, lighting airport. **$533,000.** CAA will help finance.

Me., Richmond—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Me., Rumford—AIRPORT—City, grading, lighting, paving airport. **$473,000.** CAA will help finance. CD 11/2—ENR 11/16.

Me., Sanford—AIRPORT—City, grading airport. **$181,000.** CAA will help finance.

Me., Scarboro—AIRPORT—City, grading airport. **$77,000.** CAA will help finance.

Me., Skowhegan—AIRPORT—City, grading, paving, lighting airport. **$345,000.** CAA will help finance.

Me., South Portland—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

★**Me., Van Buren**—AIRPORT—City, grading, paving, lighting airport. **$515,000.** CAA will help finance.

Me., Waldoboro—AIRPORT—City, grading, airport. **$157,000.** CAA will help finance.

Me., Westbrook-Gorham—AIRPORT—Cities, grading airport. **$157,000.** CAA will help finance.

Me., Winthrop—AIRPORT—City, grading airport. **$193,000.** CAA will help finance.

Me., Yarmouth—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Md., Abingdon—AIRPORT—City, grading, lighting airport. **$50,000.** CAA will help finance.

Md., Allens Fresh—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

★**Md., Annapolis**—AIRPORT—City, grading, paving, lighting airport. **$885,000.** CAA will help finance.

★**Md., Baltimore**—AIRPORT—City, grading, paving, lighting airport. **$1,180,000.** airport grading, lighting, **$66,000.** CAA will help finance. CD 10/21/43—ENR 10/28/43.

Md., Bel Air—AIRPORT—City, grading, paving, lighting airport. **$59,000.** CAA will help finance.

Md., Berlin — AIRPORT — City, grading, paving airport. **$42,000.** CAA will help finance.

Md., Bladensburg—AIRPORT—City, grading, paving airport. **$318,000.** CAA will help finance.

Md., Boonsboro—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Md., Brunswick—AIRPORT—City, grading, paving, lighting airport. **$325,000.** CAA will help finance.

Md., Cabin John—AIRPORT—City, grading, lighting airport. **$49,000.** CAA will help finance.

Md., Cambridge—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Md., Capitol Heights — AIRPORT — City, grading, lighting airport. **$53,000.** CAA will help finance.

Md., Catonsville—AIRPORT—City, grading, paving, lighting airport. **$319,000.** CAA will help finance.

Md., Centerville—AIRPORT—City, grading, paving, lighting airport. **$273,000.** CAA will help finance.

Md., Chesapeake City—AIRPORT—City, grading, airport. **$40,000.** CAA will help finance.

Md., Chestertown—AIRPORT—City, grading, paving, lighting airport. **$278,000.** CAA will help finance.

Md., Chevy Chase—AIRPORT—City, grading, paving, lighting airport. **$319,000.** CAA will help finance.

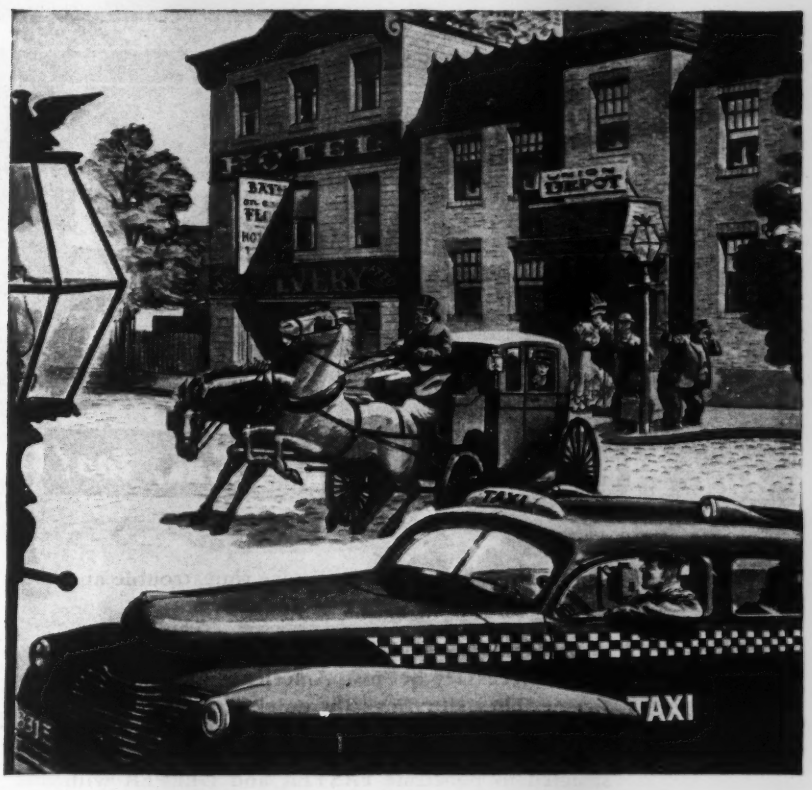
Md., Cockeysville—AIRPORT—City, grading, lighting airport. **$53,000.** CAA will help finance.

Md., College Park—AIRPORT—City, grading, paving, lighting airport. **$270,000.** CAA will help finance.

Md., Crisfield—AIRPORT—City, grading, lighting airport. **$46,000.** CAA will help finance.

Md., Deal Island—AIRPORT—City, grading, paving, lighting airport. **$283,000** CAA will help finance.

There's been a big change



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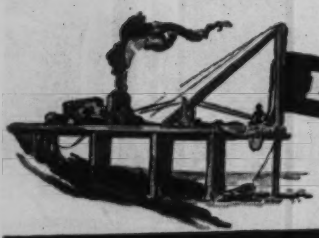

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POSTWAR PROJECTS (Cont'd.)

Md., Denton — AIRPORT — City, grading, lighting airport. $47,000. CAA will help finance.

Md., Dundalk—AIRPORT—City, grading, paving, lighting airport. $278,000. CAA will help finance.

Md., Easton—AIRPORT—City, improv. airport. $30,000. CAA will help finance.

Md., Edgemoor—City, grading, lighting airport. $53,000. CAA will help finance.

Md., Elkton — AIRPORT — City, grading, paving, lighting airport. $309,000. CAA will help finance.

Md., Ellicott City—AIRPORT—City, grading, paving, lighting airport. $52,000.

Md., Emmitsburg—AIRPORT—City, grading, paving, lighting airport. $331,000. CAA will help finance.

Md., Essex — AIRPORT — City, grading, lighting airport. $55,000. CAA will help finance.

Md., Federalsburg—AIRPORT—City, grading, lighting airport. $41,000. CAA will help finance.

Md., Forest Glen—AIRPORT—City, grading, lighting airport. $62,000. CAA will help finance.

Md., Fort Howard—AIRPORT—City, grading, lighting airport. $51,000. CAA will help finance.

★ **Md., Frederick**—AIRPORT—City, grading, paving, lighting airport. $802,000. CAA will help finance.

Md., Frostburg—AIRPORT—City, grading, paving, lighting airport. $383,000. CAA will help finance.

Md., Fullerton—AIRPORT—City, grading, paving, lighting airport. $317,000. CAA will help finance.

Md., Gaithersburg—AIRPORT—City, grading, lighting airport. $50,000. CAA will help finance.

Md., Glen Burnie—AIRPORT—City, grading, paving, lighting airport. $283,000. CAA will help finance.

Md., Grasonville—AIRPORT—City, grading, paving airport. $47,000. CAA will help finance.

Md., Greenbelt—AIRPORT—City, grading, paving, lighting airport. $323,000. CAA will help finance.

Md., Hagerstown—AIRPORT—City, grading, paving, lighting airport. $410,000. CAA will help finance.

Md., Halfway—AIRPORT—City, grading, paving, lighting airport. $393,000. CAA will help finance.

Md., Havre de Grace—AIRPORT—City, grading, lighting airport. $56,000. CAA will help finance.

Md., Hurlock—AIRPORT—City, grading, lighting airport. $41,000. CAA will help finance.

Md., Hyattsville—AIRPORT—City, paving, grading, lighting airport. $312,000. CAA will help finance.

Md., Indian Head—AIRPORT—City, grading, paving, lighting airport. $45,000. CAA will help finance.

Md., LaPlata—AIRPORT—City, grading, lighting airport. $40,000. CAA will help finance.

Md., Laurel—AIRPORT—City, grading, paving, lighting airport. $333,000. CAA will help finance.

Md., Leonardtown—AIRPORT—City, grading, lighting airport. $46,000. CAA will help finance.

Md., Lonconing—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Md., Mount Savage — AIRPORT — City, grading, paving, lighting airport. $423,000. CAA will help finance.

Md., Oakland—AIRPORT—City, grading, paving, lighting airport. $418,000. CAA will help finance.

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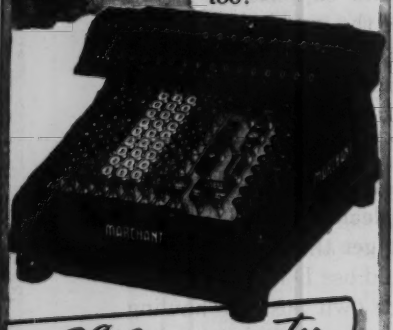

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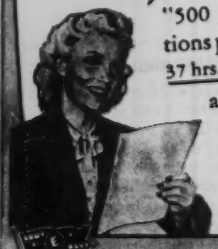

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POSTWAR PROJECTS (Cont'd.)

Md., Ocean City—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Md., Pocomoke—AIRPORT—City, grading, paving, lighting airport. **$263,000.** CAA will help finance.

Md., Prince Frederick—AIRPORT—City, grading, lighting airport. **$45,000.** CAA will help finance.

Md., Princess Anne — AIRPORT — City, grading, lighting airport. **$38,000.** CAA will help finance.

Md., Reisterstown—AIRPORT—City, grading, lighting airport. **$52,000.** CAA will help finance.

Md., Rock Hall—AIRPORT—City, grading, paving, lighting airport. **$323,000.** CAA will help finance.

Md., Rockville—AIRPORT—City, grading, paving, lighting airport. **$243,000.** CAA will help finance.

Md., St. Mary's—AIRPORT—City, grading, lighting airport. **$44,000.** CAA will help finance.

Md., Saint Michaels — AIRPORT — City, grading, lighting airport. **$47,000.** CAA will help finance.

Md., Snow Hill—AIRPORT—City, grading, lighting airport. **$41,000.** CAA will help finance.

Md., Tilgham—AIRPORT—City, grading, lighting airport. **$40,000.** CAA will help finance.

Md., Towson — AIRPORT — City, grading, lighting airport. **$51,000.** CAA will help finance.

Md., Upper Marlboro — AIRPORT — City, grading, lighting airport. **$53,000.** CAA will help finance.

Md., Western Port—AIRPORT—City, grading, paving, lighting airport. **$403,000.** CAA will help finance.

Md., Westminister—AIRPORT—City, grading, paving, lighting airport. **$293,000.** CAA will help finance.

Md., Worton Creek — AIRPORT — City, grading, lighting, airport. **$41,000.** CAA will help finance.

Mass., Adams—AIRPORT—City, grading airport. **$144,000.** CAA will help finance.

Mass., Amherst—AIRPORT—City, grading, paving, lighting airport. **$393,000.** CAA will help finance.

Mass., Attleboro—AIRPORT—City, grading, paving, lighting airport. **$448,000.** CAA will help finance.

Mass., Barre — AIRPORT — City, grading airport. **$308,000.** CAA will help finance.

Mass., Beverly—AIRPORT—City, grading, lighting airport. **$72,000.** CAA will help finance.

★**Mass., Boston** — AIRPORT — City, grading, paving, lighting airport. **$4,750,000.** CAA will help finance. CD 9/5—ENR 9/21.

★**Mass., Brockton**—AIRPORT—City, grading, paving, lighting airport. **$1,441,000.** CAA will help finance.

Mass., Burlington—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Mass., Buzzards Bay — AIRPORT — City, grading, paving, lighting airport. **$479,000.** CAA will help finance.

Mass., Carver — AIRPORT — City, grading airport. **$157,000.** CAA will help finance.

Mass., Chatham—AIRPORT—City, grading, paving, lighting airport. **$433,000.** CAA will help finance.

Mass., Essex—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Mass., Fairhaven—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Mass., Fall River—CONCRETE COVER—City, Dpt. P. Wks., City Hall, concrete cover over Quequechan River. **$250,000.** T. J. Logan, City Hall, comr. P. Wks.

Mass., Fall River—PARKS—Dpt. Parks, City Hall, plans improving parks. **$250,000.** T. J. Logan, City Hall, comr. P. Wks.

Mass., Falmouth—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Mass., Fitchburg—AIRPORT—City, grading airport. **$375,000.** CAA will help finance.

Mass., Foxboro—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Mass., Franklin—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Mass., Gardner—AIRPORT—City, grading airport. **$178,000.** CAA will help finance.

Mass., Great Barrington—AIRPORT—City, grading, lighting, paving airport. **$435,000.** CAA will help finance.

★**Mass., Haverhill**—AIRPORT—City, grading, lighting, paving airport. **$615,000.** CAA will help finance.

Mass., Hingham—AIRPORT—City, grading airport. **$284,000.** CAA will help finance.

Mass., Hinsdale—AIRPORT—City, grading airport. **$235,000.** CAA will help finance.

★**Mass., Huntington** — AIRPORT — City, grading, paving, lighting airport. **$526,000.** CAA will help finance.

Mass., Hyannis—AIRPORT—City, grading, paving, lighting airport. **$102,000.** CAA will help finance.

Mass., Lawrence—AIRPORT—City, grading, paving, lighting airport. **$422,000.** CAA will help finance. CD 9/21—ENR 9/21.

★**Mass., Lee-Lenox** — AIRPORT — Cities, grading, paving, lighting airport. **$865,000.** CAA will help finance.

Mass., Lowell—AIRPORT—City, grading, paving, lighting airport. **$473,000.** CAA will help finance.

Mass., Lynn — AIRPORT — City, grading, paving, lighting airport. **$445,000.** CAA will help finance.

★**Mass., Mansfield** — AIRPORT — City, grading, paving, lighting airport. **$502,000.** CAA will help finance.

★**Mass., Marlboro**—AIRPORT—City, grading, paving, lighting airport. **$502,000.** CAA will help finance.

Mass., Marshfield—AIRPORT—City, grading, paving, lighting airport. **$400,000.** CAA will help finance.

Mass., Monson—AIRPORT—City, grading airport. **$157,000.** CAA will help finance.

Mass., Montague—AIRPORT—City, grading, paving, lighting airport. **$220,000.** CAA will help finance.

Mass., Nantucket—AIRPORT—City, grading, paving, lighting airport. **$454,000.** CAA will help finance.

Mass., Newburyport—City, grading, paving, lighting airport. **$364,000.** CAA will help finance.

Mass., Newton—AIRPORT—City, grading airport. **$262,000.** CAA will help finance.

★**Mass., North Adams**—AIRPORT—City, grading, paving, lighting airport. CAA will help finance. **$715,000.**

Mass., North Grafton—AIRPORT—City, grading, paving, lighting airport. **$471,000.** CAA will help finance.

★**Mass., Northampton** — AIRPORT — City, grading, paving, lighting airport. **$611,000.** CAA will help finance. CD 9/12—ENR 9/21.

★**Mass., Norwood**—AIRPORT—City, grading, paving, lighting airport. **$745,000.** CAA will help finance.

Mass., Oak Bluffs—AIRPORT—City, grading, paving, lighting airport. **$314,000.** CAA will help finance.

Mass., Orange—AIRPORT—City, grading, lighting airport. **$177,000.** CAA will help finance.

Mass., Palmer—AIRPORT—City, grading, paving, lighting airport. **$344,000.** CAA will help finance.

★**Mass., Pittsfield**—AIRPORT—City, grading, paving, lighting airport. **$857,000.** CAA will help finance. CD 3/17—ENR 4/6.

Mass., Provincetown—AIRPORT—City, grading, paving, lighting airport. **$385,000.** CAA will help finance.

★**Mass., Quincy**—AIRPORT—City, grading, paving, lighting airport. **$715,000.** CAA will help finance.

Mass., Revere—AIRPORT—City, grading airport. **$376,000.** CAA will help finance. CD 1/7/44—ENR 1/27/44.

Mass., Scituate—AIRPORT—City, grading airport. **$336,000.** CAA will help finance.

★**Mass., Southbridge** — AIRPORT — City, grading, paving, lighting airport. **$518,000.** CAA will help finance.

Mass., Spencer—AIRPORT—City, grading airport. **$254,000.** CAA will help finance.

Mass., Springfield—AIRPORT—City, grading, paving, lighting airport. **$458,000.** CAA will help finance.

Mass., Stoughton—AIRPORT—City, grading airport. **$274,000.** CAA will help finance.

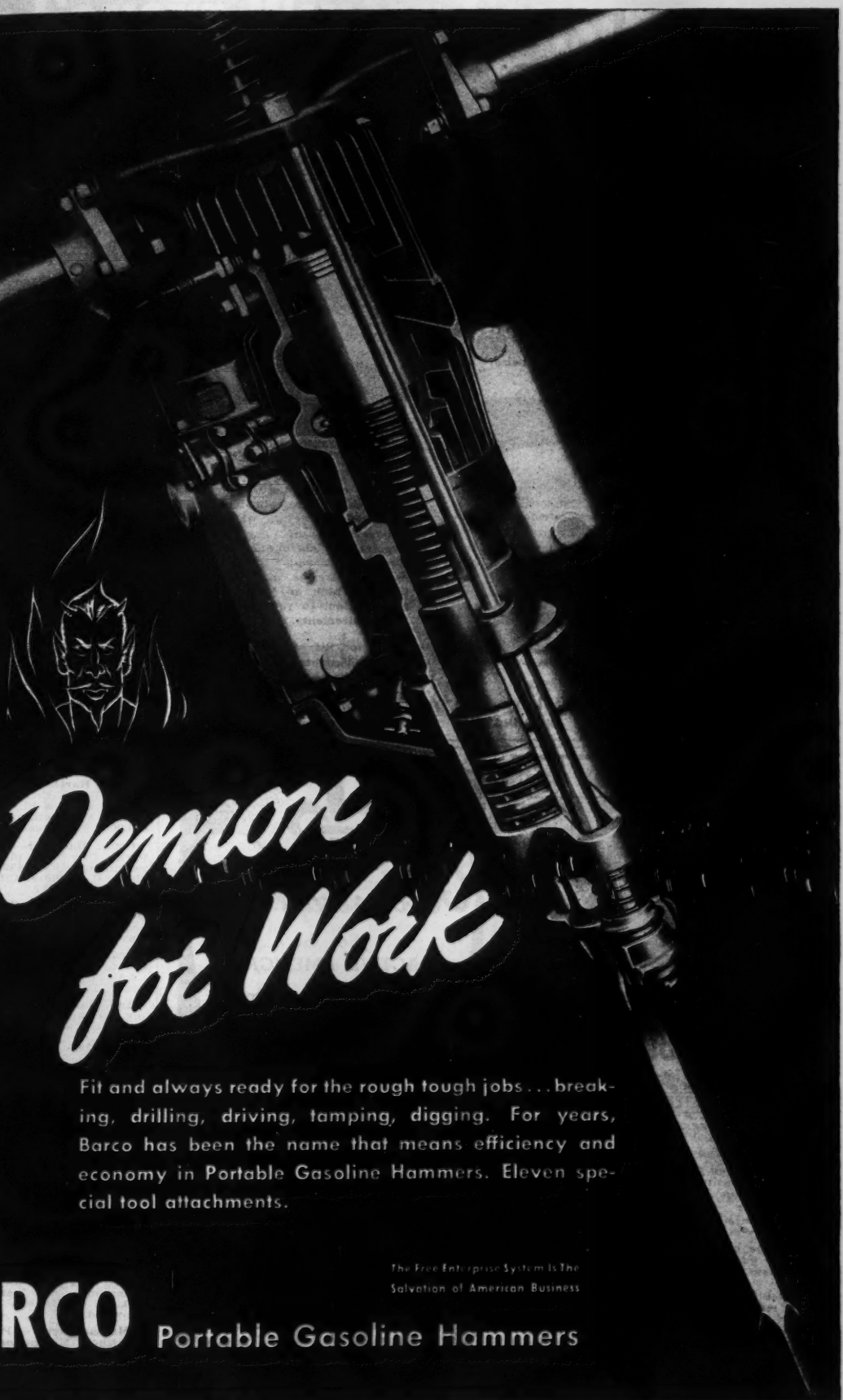
Mass., Tyngsboro—AIRPORT—City, grading, paving, lighting airport. **$419,000.** CAA will help finance.

Mass., Wakefield—AIRPORT—City, grading airport. **$382,000.** CAA will help finance.

Mass., Wareham—AIRPORT—City, grading airport. **$119,000.** CAA will help finance.

★**Mass., Webster**—AIRPORT—City, grading, paving, lighting airport. **$614,000.** CAA will help finance.

Mass., Winchendon — AIRPORT — City, grading airport. **$157,000.** CAA will help finance.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POSTWAR PROJECTS (Cont'd.)

Mich., Adrian—AIRPORT—City, grading, paving, lighting airport. $304,000. CAA will help finance.

Mich., Albion—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Mich., Alma-St. Louis—Cities, grading, paving, lighting airport. $304,000. CAA will help finance.

★**Mich., Ann Arbor** — AIRPORT — City, grading, paving, lighting airport. $730,000. CAA will help finance.

Mich., Atlanta—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Mich., Au Gres—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Mich., Bad Axe—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Mich., Bangor—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Mich., Bay City—AIRPORT—City, grading, paving airport. $84,000. CAA will help finance.

Mich., Beaver Island — AIRPORT — City, grading, lighting airport. $64,000. CAA will help finance.

Mich., Belding—AIRPORT—City, grading, lighting airport. $64,000. CAA will help finance.

Mich., Bellevue—AIRPORT—City, grading airport. $25,000. CAA will help finance.

★**Mich., Benton Harbor**—AIRPORT—City, grading, paving, lighting airport. $730,000. CAA will help finance.

Mich., Berrien Springs—AIRPORT—City, grading airport. $25,000. CAA will help finance.

Mich., Bessemer—AIRPORT—City, grading airport. $25,000. CAA will help finance.

N. Y., Lancaster—SWIMMING POOL—Village, swimming pool. $30,000. State Aid Planning Funds allotted.

N. Y., Tuckahoe—FIRE ALARM SYSTEM—Town, exten. fire alarm sys. $140,000. State Aid Planning funds allotted.

Texas — RURAL ELECTRIC LINES—Southwest Texas Electric Cooperative, Inc., Eldorado, 220 mi. rural electric lines, Schleicher Co. $150,000.

Tex., Brenham—AIRPORT—City, plans airport. $100,000 bonds voted.

★**Que., Montreal**—UNDERGROUND TRAM LINES—Montreal Tramways Co., 159 W. Craig St., underground tram lines. $50,000,000.

PLANS UNDER WAY

Conn., Hartford—COMFORT STATION, etc.—Dpt. Parks, City Hall, plans by R. F. Barker, 17 Staples Pl., West Hartford, comfort station and bathing pavilion, Keney Park, $50,000; bathhouse, Batterson Park, $35,000.

Conn., Hartford—SWIMMING POOL—Dpt. Parks, City Hall, plans completed rein.-con. swimming pool, $50,000. Financing available. R. J. Ross, City Hall, city engr. CD 1/10—ENR 1/27.

★**Idaho, Twin Falls**—AIRPORT—City, runways, bldgs. at airport. $750,000. Site acquired. CAA will help finance. J. E. Hayes, city engr.

Ind., Crawfordsville — AIRPORT — City, grading, paving, lighting airport. $365,000. CAA will help finance. L. B. Clurg, city engr. CD 10/26—ENR 10/16.

Ind., Indianapolis—AIRPORT—City, grading, paving, lighting airport $304,000; grading, etc. airport, $25,000. CAA will help finance. M. G. Johnson, city engr. CD 7/22—ENR 7/29.

Ia., Cedar Rapids—AIRPORT—City grading, paving, lighting airport. $321,000. CAA will help finance. F. E. Young, city engr. CD 10/19—ENR 11/2.

Ia., Denison—AIRPORT—City, grading, lighting airport. $114,500. CAA will help finance. $36,000 bonds voted. L. Lechtner, Ames, consult. engr.

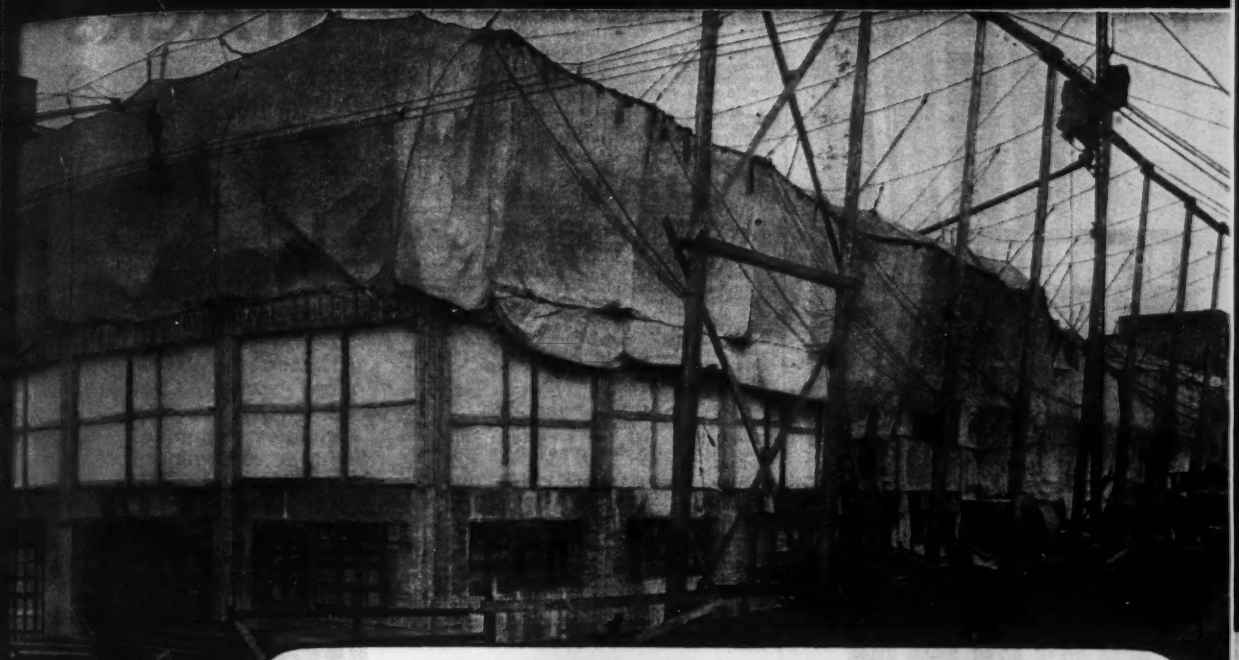
Ia., Des Moines—AIRPORTS—City, grading 2 airports. $34,000 each. CAA will help finance. J. Tippee, City Hall, city engr. CD 1/26—ENR 2/10.

Ia., Iowa City—AIRPORT—City, grading, paving airport. $100,000. CAA will help finance. F. E. Gartzke, city engr. CD 3/18/43—ENR 3/25/43.

Me., Minot—AIRPORT BLDG., etc.—R. Maheux, 63 Conant Ave., Auburn, plans completed 50 x 50 ft. and 18 x 50 ft. work shop; plans under way 3 steel hangars. Over $50,000, all at Maheux Airport. Financing not provided.

Massachusetts — PARKS, etc. — Commonwealth of Massachusetts, Dpt. Conservation, 15 Ashburton Pl., Boston, plans 25% completed parks, development for public recreation, picnics, etc., Erving, Leominster, Warwick, Winchendon, Petersham, Townsend, incl. Mt. Grace Reservations, Willard Brook State Forest and Otto River, Dist. 5, PF-6. $124,000. Financing not provided. G. B. Cabot, 80 Beacon St., Boston, archt.

ınvas Covers Winter Construction



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POSTWAR PROJECTS (Cont'd.)

★**Mass., Fall River** — AIRPORT — City, plans 15% completed airport, 3,500 ft. runways, parking area, drainage sys. lighting, hangar and office. **$685,000.** CAA will help finance. T. J. Logan, City Hall, comr.

Mass., Lawrence—STADIUM, etc.—City, plans under way completion stadium, parks and playgrounds. **$319,640.** F. A. Blackstock, city engr. CD 8/24—ENR 9/7.

★**Mass., Worcester** — AIRPORT — City, grading, paving airport. **$1,702,000.** CAA will help finance. Hallett Engrs. Associates, 38 Memorial Dr., Cambridge, engrs. CD 10/1—ENR 10/7.

★**Mich., Detroit**—PARKS—Dpt. Parks & Recreation, 735 Randolph St., plans 5% completed Brighton Summer Camp development, incl. bldgs., roads, sewers, waterlines, cleaning out lake **$170,000**; developing 25 acre park, foot Fairview Ave., **$240,000**; plans 2% completed Elmwood Recreation Bldg. and laundry unit, **$300,000**; plans 60% completed developing 45 acres Algonquin Playfield, incl. grading, seeding, roads, walks, sewers, waterlines, **$265,000**; plans 85% completed developing 17 playgrounds, incl. grading, landscaping, erecting equipment, **$90,225**; plans 30% completed Pembroke Park, 25 acre site, incl. grading, laying watermains, sewers, walks, etc., **$250,000**. G. R. Thompson, City Hall, engr.

Minn., Fairmont — AIRPORT — City, S. Stewart, clk., municipal airport. **$305,000.** CAA. Financing not provided. Ellerbe & Co., 1021-E 1st Natl. Bank Bldg., St. Paul, consult. engrs.

Minn., Thief River Falls—AIRPORT—City, P. G. Pederson, clk., plans airport. **$40,000.** CAA. P. C. Bettenburg & Co., 1427 Marshall Ave., St. Paul, consult. engr. CD 7/13—ENR 8/10.

Ore., Baker — STREET LIGHTING SYSTEM—City, plans 20% completed street lighting sys. **$80,880.** H. L. Melton, City Hall, engr.

Ore., Klamath Falls—SWIMMING POOL—City, City Hall, plans 50% completed swimming pool. **$40,000.** E. A. Thomas, City Hall, engr.

Ore., McMinnville—STREET LIGHTING—City, City Hall, plans 40% completed street lighting sys. **$125,000.** L. Courtemanche, Jr., City Hall, engr.

Ore., Medford—STREET LIGHTING—City, plans 10% completed street lighting. **$25,000.** D. T. McDonough, City Hall engr.

★**Tex., Houston**—TUNNEL, etc.—Harris County Navigation Dist., Court House, plans tunnel, at Morgans Point, **$5,000,000** ($625,000 bonds voted); tunnel under ship channel, Pasadena, **$5,000,000** ($625,000 bonds voted); rebuilding Dock 2 with double deck passenger terminal, **$400,000** (bonds voted); imprvs. south side of wharf apron, fender, railway extens., etc., **$150,000** (bonds voted); dock for deep draft boats, **$450,000** (bonds voted). CD 11/22—ENR 12/14.

Tex., San Antonio—AIRPORT—Southwest Airways Co., Love Field, Dallas, plans 1% completed airport bldgs., etc. **$150,000.** CD 7/26—ENR 8/3.

Tex., San Antonio—PARK and PLAYGROUND—City, plans community park and playground, swimming pool, bathhouse, etc., 20 acre site. **$75,000.** Financing not provided. M. L. Diver, 1504 Main Ave., consult. engr. T. H. Coghill, City Hall, city engr. CD 9/26—ENR 9/28, under Unclassified.

Washington — ELECTRIC LINES — Public Utility Dist. 1, Goldendale, plans 90% completed 354 mi. rural electric lines. Klickitat Co. **$300,000.**

Wis., Sparta—PARK—City, H. L. Beckman, clk., plans park, field house, bath house, swimming pool, sports facilities. **$50,000.** O. O. Bergmann, city engr.

READY FOR BIDS

Mich., Detroit—PARKS—Dpt. Parks & Recreation, 735 Randolph St., plans completed developing 30 acre Mack-Canyon Park, incl. water and sewer lines, grading, draining, walks, tennis courts, etc. **$265,000**; Riverside Park development, incl. walks, wharf, foot West Grand Blvd., **$50,000**; Oakwood Park improvement, 33 acre, north of Oakwood Blvd. **$168,700**; G. R. Thompson, City Hall, city engr.

Mich., Detroit—SEA LION EXHIBIT—Zoological Park Comn., Royal Oak, plans completed concrete building, sea lion exhibit, Zoological Park. **$25,000.** G. R. Thompson, City Hall, city engr. CD 8/24—ENR 9/7.

LATIN AMERICA

★**British Guiana, Demerara** — British Guiana Govt., Georgetown, plans water supply addn. **$1,700,000.** G. O. Cox, 16 Robb St., Georgetown, engr.

British Guiana, Georgetown—Government of British Guiana, Georgetown, plans drainage and irrigation at Mahaicony Berbice Dist., **$1,205,000**; at Mahaica, in Mahaicony Dist., **$514,000**; in Coventyne Coast area, **$2,812,000.** G. O. Cox, 16 Robb St., Georgetown, engr.

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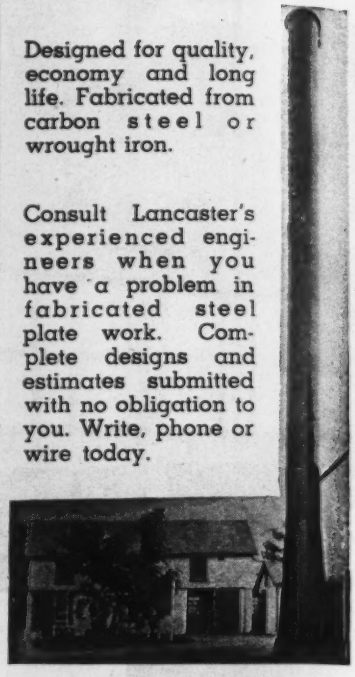

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WATER SUPPLY

PROPOSED WORK

Calif., San Diego—City, Civic Center, 16 in. watermain along Boundary St. $48,471. H. W. Jorgensen, city engr.

Conn., Wallingford—Boro, P. Merian, Washington St., preparing plans, concrete, brick filtration plant, East Wallingford, $45,000. Henry Souther Corp., 11 Laurel St., Hartford, engr.

Ont., Peterboro—Peterboro Public Utilities, R. L. Dobbin, genl. mgr., 223 Aylmer St., installing watermains in new suburban area of North Monaghan Twp. $65,000. R. H. Parsons, City Hall, engr.

Ont., Port Perry—Town, preparing plans WW sys. extens., $55,000.

Ont., Tecumseh—Town of Tecumseh Pub. Utilities Comn., N. V. Bowtellier, clk., preparing plans watermains, $30,000. C. G. R. Armstrong, Bartlet Bldg., Windsor, engr.

Que., Papineauville—Singer Mfg. Co. Ltd., Thurso, plans dam to increase water supply to plant. $50,000.

Que., Ormstown—Municipality, W. G. McGerrigle, secy., WW sys. $30,000. G. L. Wiggs & Co., 660 W. Ste. Catherine St., Montreal, engrs.

Que., St. Henri—Municipality, watermains, sewers. $55,000. R. St. Hilaire, St. Henri, engr.

Que., Ste. Sophie de Levrard—Municipality, A. Mayrand, secy., WW sys. $35,000.

BIDS ASKED

Bids Asked January 16

S. C., Spartanburg—City, addnl. pump. equip., suction well, connecting pipe for water purification plant. Wiedeman & Singleton, 1303 C. & S. Natl. Bank Bldg., Atlanta, Ga., engrs.

Bids Asked January 19

†Tex., Weslaco—City, c/o Mayor, furnishing, installing equip. for WW, Tex. 41-688-N, Contr. 5, **FWA.** Valco Inc., M & M Bldg., Houston, engrs.

Bids Asked January 19

Tex., Winters—City, T. A. Smith, mayor, dam and spillway. Plans deposit $25. French Engineering Co. Citizens Bank Bldg., Abilene, engrs. CD 10/3—ENR 10/5.

Bids Asked January 24

Tex., Irving—City, E. J. Johnson, mayor, drilling, casing deep well, furnishing, installing deep well pump. equip. Plans deposit $10. Extended date. Koch & Fowler, 701 Great Natl. Life Bldg., Dallas, engrs. CD 12/19—ENR 12/21.

Bids Asked About January 27

Ore., Eugene—City, City Hall, 16 x 48 ft., rein.-con. pump. plant. $80,000. R. B. Beals, City Hall, engr.

LOW BIDDERS

Fla., Miami—City, Item 1, furnishing, installing 10,750 ft. 30 in. c.i. pipe and 25 tons c.i. fittings, from U. S. Pipe & Foundry Co., 1st Natl. Bank Bldg., Birmingham, Ala., **$105,887**; Contr. 2, installing, furnishing 12 gate valves, 10,654 ft. 30 in. c.i. water feeder main, incl. fittings, installing submarine river watermain crossing, incl. 98 ft. joint pipe, from Leach Constr. Co., 116 N.E. 29 St., **$149,068.**

D. C., Wash.—District Comrs., District Bldg., Dec. 29, 2 m.g. elevated steel water tank, from Chicago Bridge & Iron Co., Bowen Bldg., **$159,480.** CD 12/30—ENR 12/28.

†La., New Orleans—Federal Works Agency, J. W. Bradner, Jr., dir., Electric Bldg., Fort Worth, 2, Tex., at Room 104, 526 Carondelet St., New Orleans, Dec. 27, water and sewer facilities, incl. sewage pump. sta., control equip., etc., La. 16-265 F, at Higgins (formerly Michaud) housing, for Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth 2, Tex., from Boh Bros. Const. Co., 2400 Cypress St., **$31,300. FWA.** CD 12/15—ENR 12/21.

†N. Y., West Point—U. S. Eng., 120 Wall St., New York, Zone 5, Dec. 29, filtration plant addn., from Carl Buhr, Inc., Grand Central Terminal Bldg., New York, Zone 17, **$59,419.** CD 12/21.

CONTRACTS AWARDED

Miss., Hopkins—City, F. N. Whitney, clk., furnishing, installing 500,000 gal. elevated water tank and tower, to Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago, Ill., **$446,680.** Bids 11/21. CD 11/8—ENR 6/29.

†S. C., Winnsboro—Federal Works Agency, 30 5 St. N.E., Atlanta, Ga., WW plant addn., to C. Y. Thomason, Greenwood, **$52,286.**

Tex., Houston—City, 8 and 12 in. c.i. watermains, Almeda Dist., to Russ Mitchell, Inc., 2302 Jefferson Ave., **$15,000.** Bids 12/20. CD 12/15.

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering New-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Name in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED: (except Streets & Roads): BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Alta., Lethbridge—Municipality, filtration plant addn., day labor. **$60,000.** J. Haimes, City Hall, engr.

Que., Chandler—Village, W. Lucas, secy., concrete water storage dam, Valpy River, 2nd Range, to Gaspesia Sulphite Co. Ltd., Chandler, **$34,000.** L. K. Kingston, c/o Anglo-Canadian Pulp & Paper Co. Ltd., Quebec City, engr. CD 12/19—ENR 12/28.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

★**Mo., Kansas City**—Jackson Co. Sewer Dist. 2, Kansas City, sewers, near here. $759,147. Applied to FWA. Burns & McDonnell Engrg. Co., 107 W. Linwood Blvd., Kansas City, Mo., engrs.

Pa., Lancaster—City, c/o B. E. Cary, City Hall, various storm water sewers. $150,000. J. Haines Shertzer, City Hall, engr.

Va., Virginia Beach—Town Clerk, Town Hall, addns., imprvs. sewage disposal facilities. $275,000. Greeley & Hansen, 6 N. Michigan Ave., Chicago, Ill., engrs.

Wis., Eau Claire—City, O. E. Olen, clk., garbage incinerator. A. R. Garnock, city engr.

Wis., Greenfield (P.O. West Allis)—Town of Greenfield, 7325 W. Forest Home Ave., West Allis, rein.-con. box storm sewer in S. 43 St. $70,000. H. C. Webster & Son, 739 N. 2 St., Milwaukee, Zone 2, engrs.

Ont., Acton—Town, C. F. Leatherland, clk., prepared plans sewage disposal plant. $184,000.

Ont., Port Hope—Town, preparing plans, constructing, exten. sewerage sys. and disposal plant. $170,000. G. G. Reid, 7 Edmund Ave., Toronto, Zone 5, engr.

Ont., Sault Ste. Marie—Tarentorous Twp., B. R. McMullin, clk., R. R. No. 2, preparing plans sewerage sys. $35,000. G. G. Reid, 7 Edmund Ave., Toronto, Zone 5, engr.

BIDS ASKED

Bids Asked in January

Tex., Houston—C. R. Morrison, Cit. State Bank Bldg., sanitary sewers, St. Charles Pl. Over $25,000.

Bids Asked in February

Md., Baltimore—City, c/o Bd. Awards, City Hall, 1 story, brick, concrete sewage pump. sta., incl. piping, equip. Brooklyn Sect. $200,000. G. E. Finck, Municipal Office Bldg., engr.

Bids Asked February 7

†Va., Portsmouth—City, at office A. S. Owens, city mgr., Div. Ca, suction lines and suction wells, Div. Cb, pump. sta. and equalizing well, Div. Cc, pump. equip., addns. sewerage sys., Glasgow St., Va. 44-141. **FWA.** Plans deposit $10. Greeley & Hansen, 9 N. Michigan Ave., Chicago, Ill., engrs. F. J. Bergeron, Municipal Bldg., city engr.; adv. ENR 1/11.

LOW BIDDERS

Calif., Los Angeles—City, City Hall. Dec. 27, vitr. clay sanitary sewer, Wilshire Blvd., from G. Miller, 2147 Silver Lake Dr., **$73,000.** L. Aldrich, City Hall, engr.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, Dec. 26, 1.88 mi. vitr. clay sanitary sewer Valley Ridge Ave., etc. C.I. 1092 from M. N. Guho, 3470 Olympiad Dr., **$41,240.** CD 12/4—ENR 12/7.

Calif., Monterey Park—Bd. Supervs. Los Angeles Co., Hall of Records, Los Angeles, Dec. 26, 10.41 mi. sanitary sewer in Sadler Ave., etc., C.I. 1081, from Artukovich Bros., 7320 N. Atlantic Blvd., Hynes, **$188,442.** CD 12/4—ENR 12/7.

†Calif., McClellan Field (P. O. Sacramento)—U. S. Eng., 1209 8 St., Sacramento, Zone 8, Jan. 2, industrial waste treatment plant, Spec. 1018, from Trewhitt-Shields & Fisher, 1501 Pacific Southwest Bldg., Fresno, **$35,466.** CD 12/22.

CONTRACTS AWARDED

†Fla., Panama City—Federal Works Agency, Post Office Bldg., exten. St. Andrews Sewerage Sys., to Lamar Longshore 1st Natl. Bank Bldg., Montgomery, Ala., **$41,900.** Bids 12/5. CD 11/21—ENR 11/23.

†Ill., Granite City—E. B. Grantham, mayor, City Hall, approx. 17,500 ft. 18- to 84-in. relief sewers, manholes, etc., Ill. 11-302N, to Santucci Constr. Co., Skokie, **$401,707. FWA.** Bids 12/6. CD 10/16—ENR 10/19.

†Kan., Hays—At office V. A. Basgall, city clk., sewage disposal plant enlargement, Kan. 14-258 to Grundman Constr. Co., Holton, **$37,415. FWA.** Bids 12/19. CD 12/5—ENR 12/7.

Mass., Fitchburg—J. M. Pierce, P. Wks. Comr., City Hall, sewer Highland Ave. and vicinity, own forces. **$25,000.**

BRIDGES

PROPOSED WORK

★**Kan., Kansas City**—Wyandotte Co., Kansas City, reconstructing Central Ave., viaduct. $750,000. Sverdrup & Parcel, Railway Exchange Bldg., St. Louis, Mo., engrs.

Tex., Laredo — Webb Co., c/o Judge, Laredo, voted $75,000 bonds, for bridges.

Tex., San Antonio—Bexar Co., c/o Comrs. Court, Courthouse, bridge. **$30,000.** W. F. Pickard, Courthouse, engr.

Ont., London — Council, steel, concrete bridge, Chelsea Green. $30,000-$35,000. W. C. Veitch, City Hall, engr.

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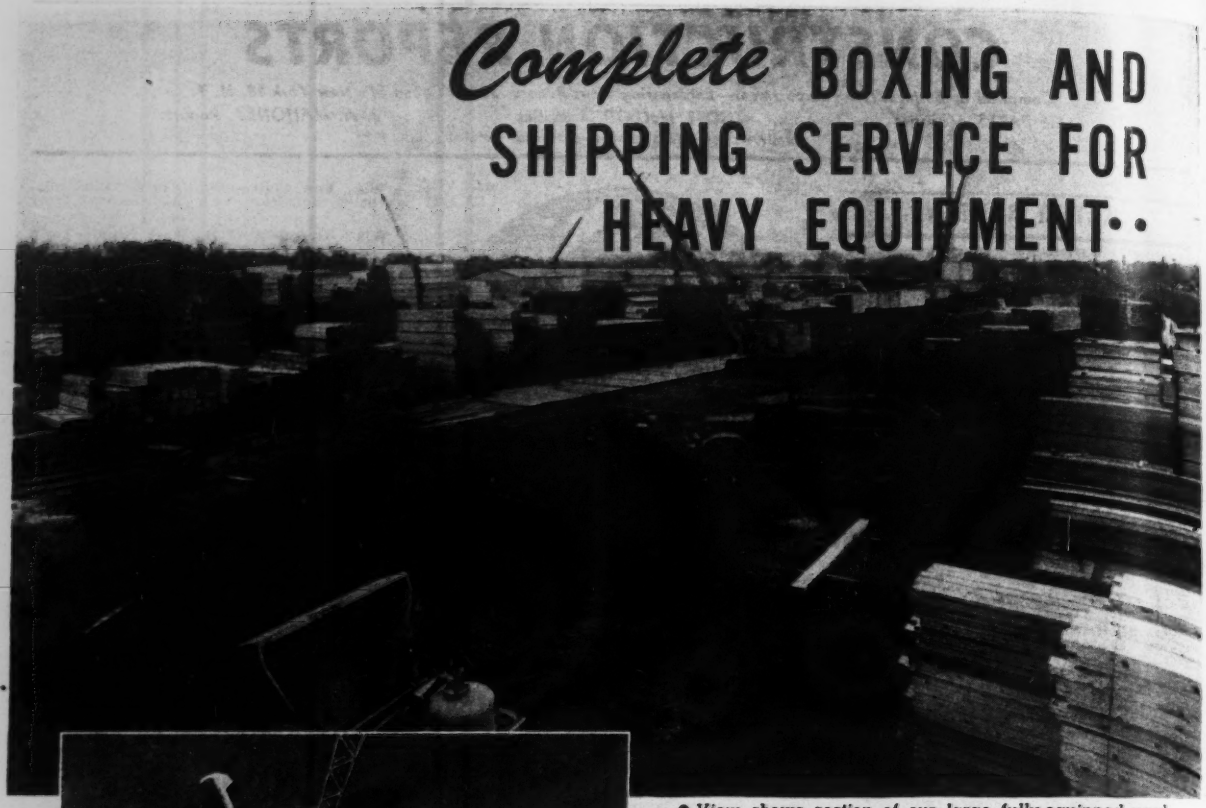

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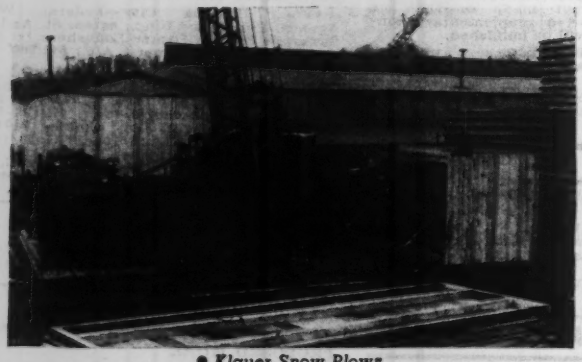

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BRIDGES (Cont'd.)

BIDS ASKED

Bids Asked January 24

Louisiana—State Hy. Dpt., D. Y. Smith, dir., Baton Rouge, repairing Mermentau River Bridge at Grand Chenier on State Route 292, S.P. 194-02-06, Cameron Parish. Plans deposit $2; culverts 0.035 mi. New Iberia-Jeanerette Hy., S.P. 4-05-06, FAP No. SN-FAP 28 (2), State Route 2, Iberia Parish. Plans deposit $3.50.

Bids Asked February 28

Tennessee and **Arkansas**—Dpt. Hys. & P. Wks. of Tennessee, C. W. Phillips, comr., Memphis, Tenn., and Arkansas State Hy. Comn., J. H. Crain, chn., at Courthouse, Memphis, Tenn., Project No. SN-A-SN-U-FAP 607-A (2), part 1, main bridge substructure, consisting Memphis abutment and 7 main piers of hy. bridge over Mississippi River, between Memphis, Tenn., and Crittenden Co., Ark. Plans deposit $20. Modjeski & Masters, State St. Bldg., Harrisburg, Pa., and Courthouse, Memphis, Tenn., engrs.; adv. ENR 1/11. CD 5/13/42—ENR 5/21/42, under Tenn., Memphis.

LOW BIDDERS

Tennessee—State Hy. Dpt., Nashville, Dec. 29, bridge, approaches, Rutherford Co., from C. A. Thompson, Centerville, **$69,407.** CD 12/15—ENR 12/21.

CONTRACTS AWARDED

Conn., Wallingford—Town, W. Loring, Town Hall, rebuilding, Quinnie Dist. bridge, Walter Ives Bridge, to Brunalli Constr. Co., Main St., Southington, **$45,000.** Bids 11/20. CD 11/17.

Georgia—State Hy. Dpt., Atlanta, bridge at Hurricane Creek and grading, surface treating approaches 0.783 mi. Alma-Baxley Rd., to G. L. Strickler, Austell, **$87,230.** Bids 12/29. CD 12/22.

STREETS AND ROADS

BIDS ASKED

Bids Asked in January

Tex., Houston—C. R. Morison, Cit. State Bank Bldg., street paving, concrete culverts. Over **$35,000.**

Bids Asked After January 1

Tex., Laredo—Webb Co., c/o Judge, Laredo, constructing, imprv., maintaining, new hard paving roads throughout county. $250,000 bonds voted.

Bids Asked January 17

Louisiana—Dpt. Hys., D. Y. Smith, dir., Baton Rouge, furnishing, del. f.o.b. railroad cars, various sidings, 16,453 cu. yd. sand clay gravel, S.P. 703-01-01. Caddo Parish.

Bids Asked January 19

Alabama—State Hy. Dpt., G. R. Swift, dir., Montgomery, base course, surface treating 6.252 mi. Stewartville-Weogufka Rd., S.A.C.P. No. 412-A, Coosa Co. Plans deposit $10.

Bids Asked January 25

California—State Div. Hys., Los Angeles, grading, bituminous surface treating 2.9 mi. hy. between point 2.5 mi. north of Victorville and vicinity Torville Airfield VIII-SBD-Victorville Airfield, San Bernardino Co, G. T. McCoy, P. Wks. Bldg., Sacramento, state hy. engr.

LOW BIDDERS

Calif., San Francisco—Dpt. P. Wks., City Hall, repairing Mission St. between 20 and 18 Sts., concrete parking lane, Spec. 19364, from M. J. Lynch, Barneveld and Oakdale Aves., **$31,863.** Est. $31,500. J. J. Casey, City Hall, city engr.

Florida—State Rd. Dpt., Tallahassee, Dec. 23, imprv. 13 mi. Rd. 79, Hillsborough Co., from L. J. and W. L. Cobb, Inc., 1st Natl. Bank Bldg., **$363,862.** CD 12/30.

Louisiana—State Dpt. Hys., D. Y. Smith, dir., Baton Rouge, Jan. 4, imprv. 21.6 mi. Grant and Winn Parishes, from E. A. Caldwell, Reymond Bldg., Baton Rouge, **$40,926.** Received no bids Jan. 4, 6 ft. canal culvert, 0.011 mi. approaches, 0.011 mi. State Route 2, Terrebonne Parish. CD 12/18—ENR 12/21.

★**Washington**—B. Bantz, dir. State Hy. Dpt., Olympia, Dec. 28, imprv. 3.4 mi. Cowlitz Co., from Erickson Paving Co., 1550 N. 34 St., Seattle, **$442,591;** 2.031 mi. Cowlitz Co., from Strong & McDonald, Rust Bldg., Tacoma, **$262,748.** CD 12/14—ENR 12/21.

CONTRACTS AWARDED

†Md., Patuxent River (br. Wash. D. C.)—Yards & Docks Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., sidewalk and curb, Naval Air Station, NOY 10947, to C. J. Langenfelder & Son, 8427 N. Philadelphia Rd., Rosedale, **$29,537.**

Minn., Austin—Mower Co., C. M. Hubbard, aud., crushed rock surfacing, to L. E. Quarve, Rochester, **$26,019.** Bids 12/19. CD 11/29—ENR 12/7.

La., Port Allen—West Baton Rouge Parish Police Jury, Port Allen, 7,000 cu. yd. washed gravel (spread dumped in places), 90 ft. 36 in. concrete or metal pipe (installed), 240 lin. ft. 42 in. concrete or metal pipe (installed), repairing 2 small wooden bridges, various parish roads, to Calmes Const. Co., 715 La. Nat. Bank Bldg., Baton Rouge, **$32,100.** Bids 12/13 awarded 1/2. CD 11/28—ENR 11/30.

Ont., London—Council, laying new asphalt and concrete pavements, own forces. **$40,000.** R. Garrett, City Hall, acting city engr.

EARTHWORK, WATERWAYS

PROPOSED WORK

Conn., New Haven—New Haven Terminal, Inc., 30 Waterfront St., 600 ft. bulkhead, 150 ft. wharf exten., dredging to gain 35 ft. depth at mean low tide, at harbor, Tomlinson Bridge. $25,000.

Neb., Elm Creek—Elm Creek Ditch Co., Elm Creek, ditch, near here. **$69,000.**

O., Cleveland—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland. Zone 15, reconstructing bulkhead along Cuyahoga River. $60,250.

BIDS ASKED

Tex., Beaumont—Neches Butane Products Co., Port Neches, 7,380 ft. outfall canal, 3 ft. deep, from Molasses Bay to Neches River. Over $15,000. CD 10/6—ENR 10/30.

Bids Asked January 27

†Wash., Prosser—Bureau Reclamation, Dpt. Interior, H. W. Bashore, comr., Yakima, earthwork and structures, Yakima Ridge Canal, Station 4712 plus 95.74 to Station 5288 plus 95.5 and wasteways 6 and 7, Roza Div. Yakima Project, 7 to 14 mi. northeast of here, Spec. 1090.

Bids Asked January 30

Mo., Richmond—Levee Dist. 5, Ray County, Richmond, 195,000 cu. yd. earth embankment in place and installing 996 ft. culvert pipe with auto hinge type flap gates attached, etc. E. I. Myers, Law Bldg., Kansas City, Mo., consult. engr.

†Nev., Boulder City—Bureau Reclamation, Dpt. Interior, H. W. Bashore, comr., Boulder City, tunnel and river-channel imprvs. at Boulder Dam, Boulder Canyon Project, Arizona-California-Nevada, on Colorado River, about 5 mi. northeast of here, Spec. 1089.

Bids Asked February 2

†Idaho, Coeur d'Alene—Bureau Reclamation, Dpt. Interior, H. W. Bashore, comr., Coeur d'Alene, temporary Pump. Plant B and discharge lines, Post Falls, Rathdrum Prairie Project, near here, Spec. 1091.

LOW BIDDERS

†Louisiana—U. S. Eng., Box 60, Vicksburg, Miss., approx. 140,000 cu. yd. channel enlargement, Loggy Bayou, Solic. No. 22-052-45-60, Red River Parish, from Edward E. Morgan Co., Inc., Standard Life Bldg., Jackson, Miss., **$119,000.** CD 12/12—ENR 12/14.

†Louisiana—U. S. Eng., foot Prytania St., New Orleans, Dec. 29, dredging, disposing approx. 50,000 cu. yd. material in Belle Pass Outlet of Bayou Lafourche, Solic. No. 16-047-45-76, Lafourche Parish, from Stevens & Co., Whitney Bldg., New Orleans, **$22,000.** CD 12/19—ENR 12/21.

†Okla., Altus—Bureau Reclamation, Dpt. Interior, H. W. Bashore, comr., Jan. 6, earthwork and riprap, from Stamey Constr. Co., Hutchinson, Kan., **$189,389.** Est. $100,000. CD 12/1—ENR 12/7.

CONTRACTS AWARDED

†Conn., Stratford—U. S. Eng., 31 St. James Ave., Boston, Mass., repairing 1¼ mi. protective dike, Marine Basin, south end, No. 19-023-45-NEG 73, to White Oak Excavators, Inc., 59 E. Main St., Plainville, **$15,850.** Bids 1/5.

LATIN AMERICA

Brazil, Ouro Preto—Republic of Brazil, Rio de Janeiro, plans developing Pyrite mines. $100,000. Ministry of National Defense, Rio De Janeiro, engr.

Brazil, Porto Alegre—Empresa Riograndense de Mate Ltda., Rua Sigeuira Campas, 1170, plans caffeine, etc., mfg. plant exten. $50,000.

Brazil, Rio de Janeiro—Pan Brazil Ltda., Rua Stapiru 49, Rio de Janeiro, plans plant addn. $40,000.

Brazil, Salvador—Raphael Serravale & Filhos, Rua Barao de Cotegipe, 36, plans factory, $40,000.

Dominican Republic, Ciudad Trujillo—Republic of Dominica, Ciudad Trujillo, will enlarge and improve port facilities, incl. 1,000 ft. exten. to breakwater, constructing 820 lin. ft. rein.-con. bulkhead for docking and constructing two 60x800 ft. steel, concrete warehouses, by own forces, **$2,000,000;** dredging harbor to depth of 34 ft., by day labor, **$300,000,** Dpt. P. Wks., Ciudad Trujillo, engr.

Mexico, Mexico City—Aeromex, S. A. Calz. de San Simon, 67 Mexico, D. F., plans factory for making bushings and spacers for war and commercial aircraft and screws and bolts for airplanes. $150,000.

Mexico, Mexico City—Productos de Vidrio, S. A., Motolinia, 5-306, Mexico, D. F., plans glass factory for manufacturing serum tubes, assay tubes, droppers, serum flasks, etc. $150,000.

Mexico, Vera Cruz—Mexican Govt., Scrita. de la Marina, Mexico, D. F., plans constructing, reconstructing marine warehouses and storehouses. $410,000.

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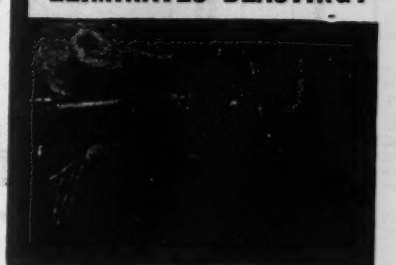

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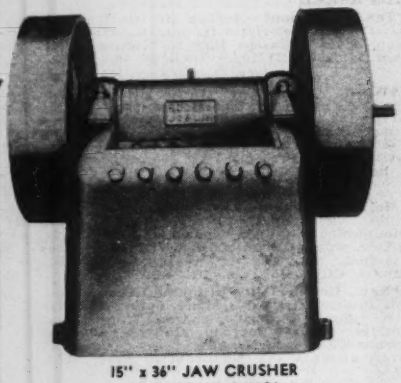

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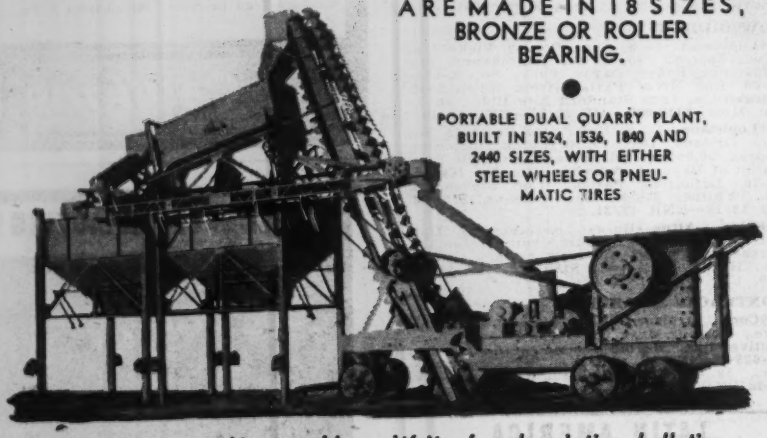

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PROPOSED WORK

†**Colo., Denver**—U. S. Eng., 909 17 St., neuro-psychiatric and social therapy bldg. at Fitzsimmons General Hospital. $30,000.

†**Colo., Denver**—U. S. Eng., 909 17 St., rehabilitating mfg. bldg. into food processing plant at Denver Ordnance Depot. $190,000.

†**Calif., Indio**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 15 unit family stop-gap housing, Calif. 4076.

★ †**Colo., Denver**—U. S. Eng., 909 17 St., forge plant, at Denver Ordnance Depot. $500,000-$750,000.

Kan., Arkansas City—City plans election $350,000 bonds for memorial hospital and training school.

★ **La., Baton Rouge** — State University, Baton Rouge plans by Bodman & Murrell, Reymond Bldg., men's housing unit. $1,000,000.

Me., Lewiston—City, Bd. Educ., Dr. H. Blair, chn., City Hall, central school. Over $150,000.

†**Md., Baltimore**—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash., 25, D. C., making plans altering Heating Plant 1, incl. installing addnl. boilers and founds., at Holabird Signal Depot. $54,000.

†**Md., Baltimore — Pub.** Improvements Comn., City Hall, bids soon elementary and junior high school. Md. 18-215. $294,000. **FWA.** Buckler & Fenhagen, 325 N. Charles St., archts.

†**Mass., Bedford**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., dental clinic exten.

†**Mass., Northampton**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., brick, dental clinic exten.

†**Mass., Springfield**—Pub. Housing Auth., NHA, 24 School St., Boston, Zone 8, 150 unit single person housing, Mass. 19092.

★ **Mass., West Roxbury** — Veterans Admin., Vermont Ave. between H and I Sts. N.W., 25, D. C., hospital addns. $780,000. CD 12/21—ENR 12/21.

Mich., Monroe—City, plans by R. M. Dunbar, 209 Reisig Bldg., 1 story, 95x232 ft., tile, concrete, garage, plain fdn. $60,000.

Mo., Potosi—City, G. F. Cresswell, mayor, City Hall, voted bonds municipal light and power plant with equip. and distr. sys. $60,000.

†**N. M., Gallup**—Office of Indian Affairs, Dpt. Interior, Interior Bldg., 19 and C Sts. N.W., Wash. 25, D. C., 2 dormitories at Dennehotso Indian School. $21,500.

†**N. M., Santa Fe**—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Zone 2, Tex., 50 unit family stop-gap housing, N.M. 29183.

N. Y., Cortland—Dpt. Educ., Education Bldg., Albany, bids soon maintenance storage bldg.

†**N. Y., Syracuse**—Pub. Housing Auth., NHA, 270 Bway., New York, Zone 7, 350 unit single person housing, N.Y. 30180.

N. S., Windsor—Hospital Bd., Windsor, nurses home at Payzant Memorial Hospital. $150,000.

†**O., Canton**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, Zone 15, 55 unit single person stop-gap housing, Ohio 33309.

†**O., Cleveland**—Pub. Housing Auth., NHA, 2073 E. 9 St., Zone 15, 150 unit single person housing, Ohio 33303.

Ore., Portland—School Bd., Portland, new Creston School, S.E. 47 St. and Powell Blvd. $180,000. Seeking FWA funds.

★ **Pa., Phila.**—Commonwealth of Pennsylvania, Philadelphia State Hospital, Dr. C. Zeller, supt., A. J. Worlow, ch. engr., North Wing, Capitol Bldg., Harrisburg, plans completed by H. A. Kuljian, & Co., engrs.-archts., 1518 Walnut St., dietary kitchen bldg., (female side), Phila. State Hospital. $500,000. CD 9/25—ENR 9/28.

†**Utah, Ducheane**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, Calif., 40 unit family trailer housing, Utah-42202.

★ †**T. H., Oahu**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., plans by Dickey Associates & Mark Potter, S. M. Damon Bldg., Honolulu, 1,000 unit family housing. TH-1-5. CD 12/4—ENR 12/7.

B. C., Abbotsford—School Dist., Abbotsford, high school. $150,000.

B. C., Kamloops—Municipality, city hall, $150,000. Site purchased.

B. C., Saanich—School Bd., Saanich, school. $156,000.

New Brunswick—Province of New Brunswick, Fredericton, training school. $150,000. Site not selected. Dpt. P. Wks., Fredericton, engrs.

N. B., Saint John—Bd. Educ., City Hall, school, St. James and Wentworth Sts., $200,000.

Ont., Kitchener—Public School Bd., Kitchener, school. $300,000.

★ **Ont., London**—Dpt. P. Wks., Hon. A. Fournier, minister, Ottawa, brick, stone, steel bldg. to house all government offices on site of old post office, Richmond St. $750,000.

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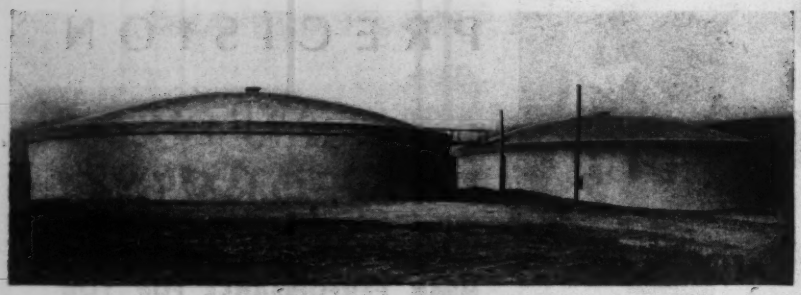

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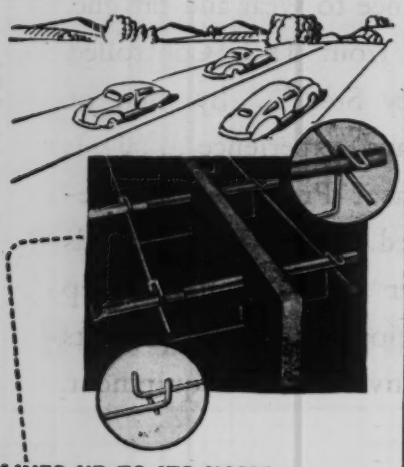

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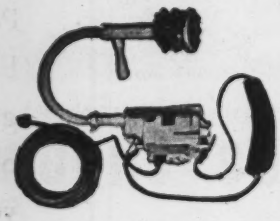

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PUBLIC BLDGS. (Proposed Work, Cost \$.)

Ont., Orillia—Orillia Water, Light & Power Comn., 25 West St. N., Dr. R. E. Hipwell, chn., 3rd power plant, \$250,000. L. G. McNeice, c/o Owner, engr.

Ont., Oshawa—Property Com. of the Oshawa Bd. Educ., W. J. Naylor, chn., tentative plans drawn by J. B. Parkin, 36 Bloor St. W., Toronto, public school, incl. gymnasium, kitchen, lunchroom, etc., Roxborough Ave. and Elgin St.

Ont., Park Hill—Bd. Educ., Park Hill, high school. \$200,000.

★**Ont., Toronto**—University of Toronto, Simcoe Hall, Queens Park, plans by Forsey, Page & Steele, 20 St. Clair Ave. W., chemistry bldg. \$800,000. CD 2/9—ENR 2/17.

Quebec—Provincial Govt., Dpt. Public Instruction, Quebec City, plans 2 normal schools at St. Stanislas and St. Anne des Monts, and domestic science school at St. Cesaire. \$200,000.

Que., Knowlton—Municipality, c/o Dr. W. P. Percival, dir. Protestant Education, Quebec City, composite high school. \$200,000.

Que., St. Joseph D'Alma—Municipality and group of local citizens, sponsors, plans by Rousseau & Begin, 1 Ferland St., Quebec City, community centre, incl. large hall, swimming pool, recreation and meeting rooms, etc. \$325,000. CD 12/28.

Sask., Saskatoon—Wartime Housing Ltd., 557 York St., Toronto, Ont., 1½ story, brick dwellings, concrete fdns., on 35 ft. and 50 ft. lots. \$250,000.

BIDS ASKED

Bids Asked in January

†**Mo., Fort Leonard Wood (br. St. Louis)**—Federal Works Agency, City Hall, St. Paul, Minn., recreational bldg. \$65,000. CD 11/14—ENR 11/16.

Bids Asked January 16

†**Va., Fort Myer (sta. Arlington)**—U. S. Eng., 1 and Douglas Sts. N.W., Wash. 25, D. C., 3 barracks bldgs. and messhall for WACS. CD 12/12—ENR 12/14.

Bids Asked January 19

Calif., Lakewood Village—Lakewood School Dist., 5021 Centralia Ave., frame, stucco, addns. Junior High School. \$200,000. Kistner & Wright, 412 Architects Bldg., Los Angeles, archts. CD 8/16—ENR 8/24.

Bids Asked January 23

Minn., Jackson—City, A. E. Wallace, clk., furnishing, installing 2,000 kw. turbine generator unit, surface condenser, auxiliary equip. in power plant. \$80,000. J. B. Harris Co., 416 Essex Bldg., Minneapolis, engrs. CD 6/22—ENR 8/24, under Postwar Projects.

B. C., Vancouver—Secy. Dpt. P. Wks., Ottawa, Ont., chest unit bldg. at Shaughnessy Hospital. \$175,000. Plans deposit \$50. C. D. Sutherland, c/o owner, and Mercer & Mercer, 615 W. Hastings St., Vancouver, archts. CD 8/25—ENR 8/31.

Bids Asked January 25

†**Md., Baltimore**—At office H. P. Hopkins, archt., 10 E. Mulberry St., 3 story, bsmnt., sub-bsmnt., brick nurses home, training facilities, Md. 18-207, for West Baltimore General Hospital, Rayner and Dukeland Aves. \$250,000. **FWA.** Plans deposit \$25. CD 10/18—ENR 10/26.

Bids Asked February 13

★†**Tenn., Murfreesboro**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., addnl. bldgs., Veterans Hospital. \$2,000,000. CD 2/16—ENR 2/24.

Bids Asked in Spring

★**Mass., Wrentham** — Commonwealth of Massachusetts, Dpt. Mental Health, 190 Nashua St., Boston, brick, steel, power plant at State School. \$500,000. D. D. Eames, 739 Boylston St., Boston, engr.

LOW BIDDERS

†**Ala., Tuskegee**—Tuskegee Institute, Tuskegee, Jan. 3, nurses home, Ala. 1-293-N, from R. P. Farnsworth & Co., 1515 S. Salcedo St., New Orleans, La., **\$293,696. FWA.** CD 12/20—ENR 12/28.

Calif., Woodland—Yolo Co., c/o C. L. Hiddleson, clk., County Courthouse, Dec. 28, 70 bed hospital, from A. R. Liner, P. O. Box 45, Merced, **\$197,576.** CD 12/12—ENR 12/14.

†**D. C., Bellevue**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., Dec. 23, machine shop exten. at Naval Research Laboratory, NOY 10558, from J. D. Hedin Constr. Co., 820 Michigan Ave. N.E., Wash., D. C., **\$110,000.** CD 12/13.

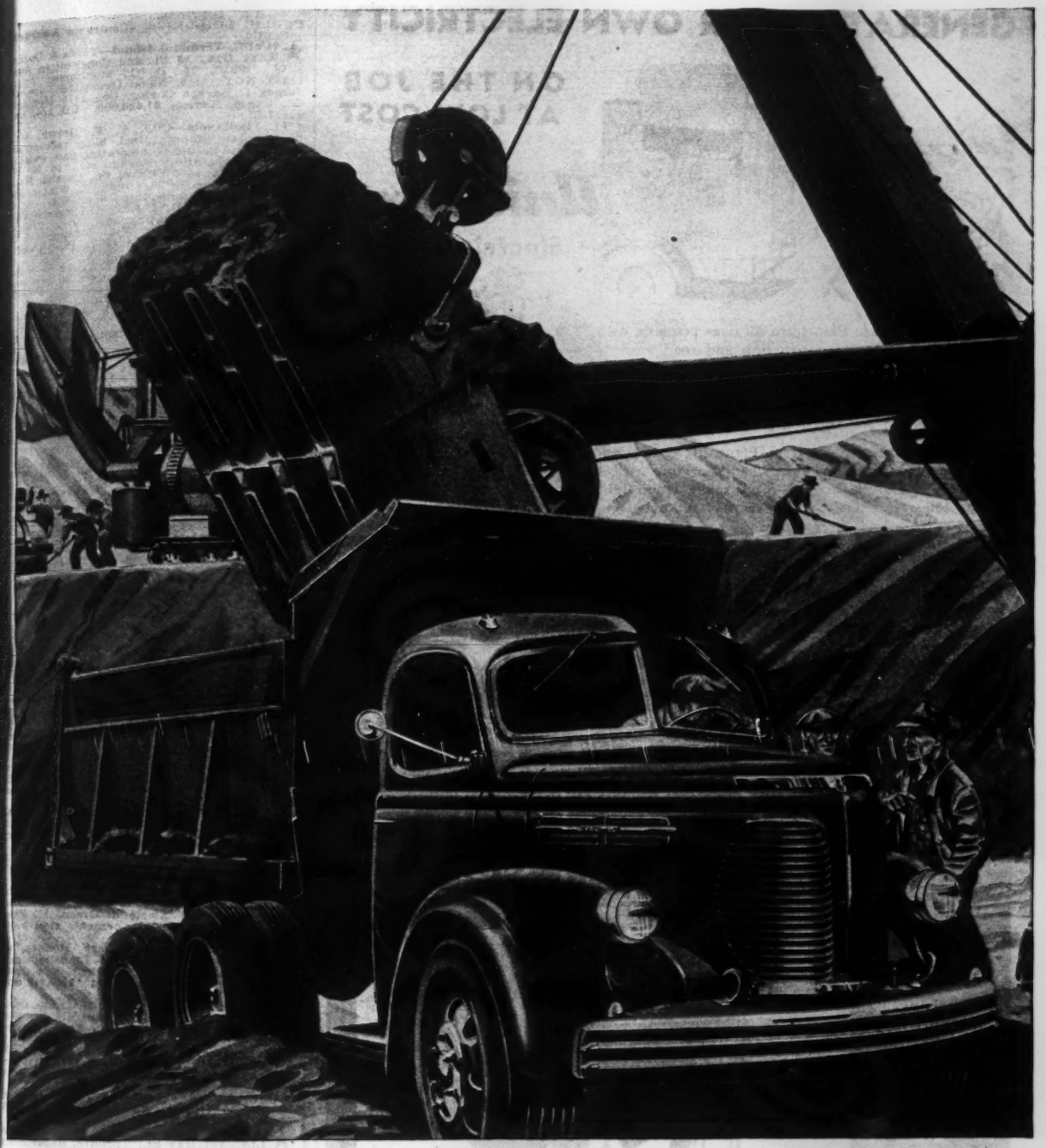
†**Miss., Pascagoula** — Pascagoula Rural Separate School Dist., Dec. 29, 1 story Junior High School, Miss 22-210, from R. P. Farnsworth & Co., Inc., 1515 S. Salcedo St., New Orleans, La., **\$183,123. FWA.** CD 12/13—ENR 12/21.

CONTRACTS AWARDED

★†**Calif., Pleasanton**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, 274 unit family dwellings, Calif. 4893-N, to G. W. Williams Co., 10 California Dr. Burlingame, **\$846,470.** Bids 11/28. CD 12/4—ENR 12/7, under LB.

†**Calif., Port Chicago**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., battery charging electric truck and overhaul shop and storage bldg., inland area, NOY 11332, to Moore & Roberts, 695 Mission St., San Francisco, **\$138,750.** Bids 12/19.

★†**Calif., San Francisco**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., quarters for Waves, at Balboa Park, Spec. 14439, NOY 9974, to Dinwiddie Const. Co., Crocker Bldg., **\$931,800.** Bids 12/20.



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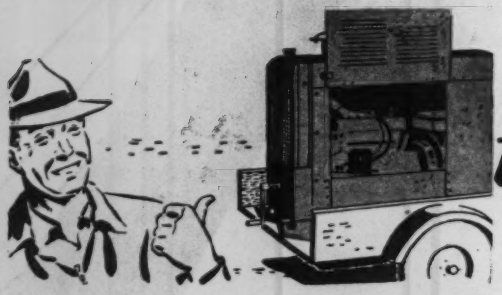

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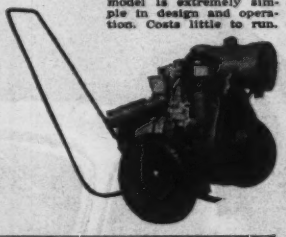

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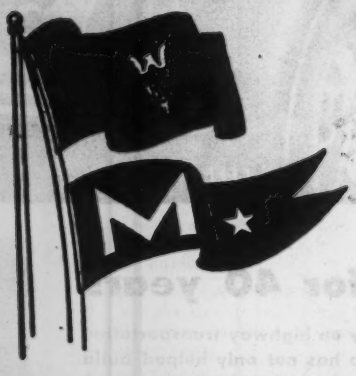

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PUBLIC BUILDINGS. (Contracts Awarded, Cont'd.)

★†**Calif., Terminal Island**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash. 25, D. C., storehouse. Spec. 15459, NOY 11119, Naval Operating Base, to James I. Barnes Constr. Co., 1119 Montana St., Santa Monica, **$1,420,000**. CD 1/4, under LB.

Ia., Indianola—City, C. F. Brown, clk., power plant imprvs., incl. bldg. reconstruction and addn. diesel generating unit, switchboard and station wiring, etc., to R. W. Hughes Co., 5626 William St., Omaha, Neb., **$109,451**. Bids 12/20. Buell & Winter, 500 Insurance Exchange Bldg., Sioux City, engrs.

†**Ill., Elwood**—U. S. Eng., 820 Merchandise Mart, Chicago, heating sys., etc., Elwood Ordnance Plant, Contr. W-11-022-eng-1184, to H. P. Reger & Co., 1501 E. 72 Pl., Chicago, **$59,000**.

†**Kan., Herington**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., 2 warehouses, to Busboom & Rauh, 155 S. Santa Fe St., Salina, **$54,000**.

Mich., Eloise — Bd. Auditors Wayne Co., County Bldg., Detroit, brick, steel, rein.-con. stone health clinic, to A. W. Kutsche Co., 2111 Woodward Ave., Detroit. **$150,000**. CD 12/7.

Minn., Springfield—City, A. C. Mueller, clk., furnishing, installing steam turbine unit in power plant, to Worthington Pump & Mach. Corp., 2423 University Ave., St. Paul, **$59,930**. Bids 12/13. CD 12/5—ENR 11/1.

†**Pa., Allentown**—Consolidated Vultee Aircraft Corp., 1901 S. 12 St., cafeteria and office bldg. addns. to R. Wolfet, Markle Bank Bldg., Hazelton, **$75,000**. Awarded 12/12. Defense Plant Corp. will finance. J. C. Mackenzie, 5 E. 57 St., New York, N. Y., archt. CD 10/17—ENR 10/19.

†**Pa., Meadville**—David Meade Distilling Co., M. Leff, in charge, Race St., general contract alcohol producing plant addn., incl. changes in boiler room for installation addnl. boiler, water tower, equip., incl. drying equip., water conditioner, water cooling equip., to J. M. Baldwin, Whitfield Bldg., Pittsburgh, incl. mechanical trades. Est. **$100,000**. Defense Plant Corp. will finance. J. Breslove, Leader Bldg., Cleveland, O., consult. engr. CD 11/6—ENR 11/9.

★†**Tex., Houston**—Brown & Root, Inc., Box 4300, Calhoun Rd., plant. Owner builds. **$300,000**. Total est. $3,000,000 incl. equip. Some bldgs. at adjacent army camps will be moved to this plant and used, others will be constructed. Defense Plant Corp. will finance. CD 1/3.

COMMERCIAL BUILDING

PROPOSED WORK

Mich., Mt. Clemens — Mt. Clemens General Hospital, Mt. Clemens, plans by A. A. Webber, 160 Market St., brick, steel, concrete hospital addns. $150,000.

Mo., Kansas City—St. Mary's Hospital, ★2300 Main St., plans by Carroll & Dean, R. A. Long Bldg., 6 story hospital, 4 story convent structure. $1,000,00.

Pa., Middletown—W. M. Hollinger, 104 Market St., Harrisburg, 50 two story, brick residences. $200,000.

★**Pa., Williamsport**—Williamsport General Hospital, c/o S. T. McCormick, Williamsport, plans by Lawrie & Green, 323 Front St., Harrisburg, brick, cement, steel hospital addns. $500,000.

Tex., Conroe—Montgomery Housing Co., Conroe, plans by Hedrick & Lindsley, engrs.-archts., 811 Southern Standard Bldg., Houston, 25 unit housing. Est. $150,000 completed. FHA.

Va., Norfolk—At office A. M. Lublin, archt., Dickson Bldgs., soon lets contract, post office substation, 38 St., for Ben Simon & Associates, Flat Iron Bldg.

Wyo., Cheyenne—D. W. Garlett Co., 120 W. 17 St., plans by F. H. Porter, 2118 Central Ave., 2 story, bamnt., 44x115 ft., brick, steel, business and store bldg.

Ont., Leaside (Postal Dist. Toronto)—M. Sharp, 20 Hilltop Rd., Forest Hill, dwellings. $150,000.

★**Ont., Ottawa**—F. W. Woolworth Co., Ltd., 357 Bay St., Toronto, departmental store, Rideau St. $500,000.

Ont., Toronto—B. & F. Theatres, Ltd., Royal Bank Bldg., plans by Kaplan & Sprachman, 305 Dundas St. W., 75x115 ft., steel beam, masonry theatre, concrete fdn. $160,000.

Ont., Toronto—R. McClintock, 215 Westwood Ave., 40 bungalows. $150,000 plus.

Que., Montreal — Norwegian Woodcraft Reg., 2240 Madison Ave., plans 2 story, brick dwellings, Madison Ave. $150,000.

Que., Quebec City—Caisse Populaire de St. Joseph, c/o C. A. Jean, archt., plans 2 Abraham Hill, dwellings. $150,000.

BIDS ASKED

Bids Asked About January 25

★**La., Alexandria**—Baptist Hospital, Alexandria, hospital unit. $600,000. Neild, Somdal & Neild, City Bank Bldg., Shreveport, archts. CD 11/5—ENR 11/30, under Postwar Projects.

Bids Asked in Spring

S. D., Huron—St. Johns Memorial Hospital, c/o Franciscan Sisters, Huron, Rev. J. J. O'Neil, pastor, St. Martins Church, Huron, hospital. $414,000. Magney, Tusler & Setter, 202 Foshay Tower, Minneapolis, Minn., archts. CD 8/16—ENR 8/24.

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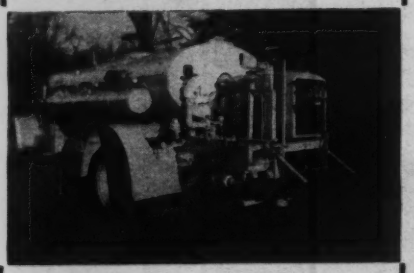

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

CONTRACTS AWARDED

Calif., Los Angeles—Roman Catholic Archbishop of Los Angeles, c/o P. Kingsbury, Washington Bldg., 2 story, bsmnt., 62x190 ft. parochial school, St. Alphonsus Parish, Amolia St., to J. A. McNeil Co., 714 W. Olympic Blvd., over **$150,000.** S. B. Barnes, 803 W. 3 St., engr.

N. C., Charlotte — Presbyterian Hospital, J. P. Richardson, supt., 200 Hawthorne Lane, general contract 6 story, brick, steel hospital addn., alterations, to J. A. Jones Const. Co., 209 W. 4 St., **$223,612.** CD 11/8—ENR 11/16.

O., Cleveland—May Co., S. H. Gross, treas., Euclid Ave., altering department store, to Sam W. Emerson Co., 1836 Euclid Ave. Est. **$150,000.** F. Hauska, Chester Ninth Bldg., archt.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ala., Opelika—MILL—Pepperrell Mfg. Co., Opelika, plans by Robert & Co., Bona Allen Bldg., Atlanta, Ga., cotton textile mill addn. $325,000.

Conn., Hartford—GARAGE—Owner, c/o Kane & Fairchild, archts., 49 Pearl St., 1 story, 45x100 ft. and 40x100 ft. brick, steel, service garage addns. $40,000.

Conn., Norwich—FACTORY—U. S. Finishing Co., Greenville, Norwich, sketches factory addns., alterations. Over $40,000. Lockwood Greene Co., 10 Rockefeller Place, New York 20, N. Y., engr.

Ind., Muncie—PLANT—Ball Bros. Glass Co., J. W. Fisher, mgr., Macedonia Ave. at 9 St., rebuilding portion plant. $100,000 or more.

★**Ill., East St. Louis**—PLANT—General Chemical Co., East St. Louis, 35,000 ton annual capacity plant. $500,000.

★**Ill., Monsanto (br. East St. Louis)**—PLANT—Monsanto Chemical Co., 1700 S. 2 St., St. Louis 4, Mo., sulfuric acid plant, in vicinity. About $700,000.

Kan., Hutchinson—GARAGE—H. L. and J. McVey, 16 East A St., plans by McCracken & Hiett, 308 W. 20 St., 1 story, 50x165 ft. bus garage. $50,000.

Ky., Newport— FACTORY — Made-Rite Furnace & Piping Co., 2359 Cormany Ave., Cincinnati, O., altering 2 factory bldgs. $81,-157.

Mass., Roxbury—TRUCK and FREIGHT TERMINAL—T. F. Galvin, 909 Mass. Ave., plans 40x80 ft. and 60x150 ft. truck service and freight terminal, incl. loading dock.

Md., Sparrows Point (br. Baltimore)—MILL—Bethlehem Steel Co., E. 3 St., Bethlehem, Pa., completed plans 56 in. cold strip mill.

Mich., Detroit—PLANT—American Smelting & Refining Co., Federated Metals Div., 11630 Russell St., preparing plans brick, steel, concrete plant addn. for chlorine rack house and dross room. $70,000.

★**Mich., Detroit**—PLANT—United States Rubber Co., 6600 E. Jefferson Ave., soon lets contract mfg. plant addn. $3,000,000. Lockwood Greene Engineers Inc., 10 Rockefeller Plaza, New York, 20, N. Y., engrs. CD 1023—ENR 10/26.

Minn., Cloquet—STEAM GENERATING UNIT—Northwest Paper Co., Cloquet, furnishing, installing new steam generative unit, plant addn. $80,000.

Mo., St. Louis—PLANT—National Lead Co., International Office Bldg., 8 and Chestnut Sts., Zone 1, plant. $200,000 plus with equip.

★**N. Y., Deferiet**—MILL—St. Regis Paper Co., 230 Park Ave., New York, Zone 17, plans by Charles T. Main, Inc., 201 Devonshire St., Boston, Mass., paper and pulp mill. $3,000,000.

★**N. Y., Syracuse**—PLANTS—General Electric Co., 1 River Rd., Schenectady, preparing plans group brick, steel, concrete industrial plant bldgs. $500,000. Giffels & Vallet, 1000 Marquette Bldg., Detroit, Mich., engrs.-archts. CD 11/17-ENR 11/23.

N. J., Bayonne — LABORATORY — Richfield Oil Corp., 261 W. 1 St., 1 story, steel, cinder block laboratory. $45,000.

N. J., Bergenfield—FACTORY—Park Instrument Co., 53 Central Ave., Rochelle Park, 1 story, 62x222 ft., brick, cinder block factory. $50,000.

N. M., Belen—ROUNDHOUSE—Atchison, Topeka & Santa Fe Ry. Co., J. A. Noble, ch. engr. (western lines), Amarillo, Tex., roundhouse. $75,000.

N. M., Clovis—ROUNDHOUSE—Atchison, Topeka & Santa Fe Ry. Co., J. A. Noble, ch. engr. (western lines), Amarillo, Tex., roundhouse. $100,000.

N. Y., Albion—FACTORY—GLF Orleans Farm Producers Co-operative, Inc., c/o M. S. Hatch, Albion, canning factory and food processing plant. $50,000 with equip.

N. C., Ocracoke—POWER PLANT—Rural Electric Admin., W. R. Dixon, mgr., Ocracoke, soon lets contract, power plant addn. and unloading wharf.

O., Cincinnati—FACTORY—Delco Products Div. General Motors Corp., 1916 Elm St., Cincinnati, Zone 12, altering factory. $87,942.

O., Cincinnati—FACTORY—Hess & Eisenhardt Mfg. Co., 4119 Spring Grove Ave., factory. $100,000.

O., Cleveland—FACTORY—R. Cable Barrel Co., J. V. Klein, mgr., E. 49 St., 1 story, 60x100 ft., brick, steel factory addn., 30x30 ft. boiler house, 150 hp. boiler with stoker. $40,000. V. Eaton, 3030 Euclid Ave., engrs.

O., Cleveland—FOUNDRY—Hines Flask Co., 1324 Hird Ave., Lakewood, Zone 7, brick, steel foundry bldg. $92,000.

O., Dayton—FACTORY—Wm. Focke's Sons Co., 1712 Springfield St., altering factory. $40,-200.

O., Mansfield—STORAGE BIN, etc.—Westinghouse Electric & Mfg. Co., Maloney Bldg., Pittsburgh, Pa., storage bin and tank. $32,-890.

★**O., Newark**—MILL—Pharis Tire & Rubber Co., Newark, reconstructing 3 story, 50x150 ft., brick, steel, concrete mill and boiler house. $615,000. Osborn Engr. Co., 7016 Euclid Ave., Cleveland, engr.

Ore., Astoria—PLANT and PIER EXTENSION—Columbia River Salmon Co., cannery bldg. addn. and 105 ft. pier exten. $100,000.

Pa., Bridgeville — FACTORY — American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York 20, N. Y., factory addns., alterations. $63,800.

Pa., Clairton — PLANT — Carnegie-Illinois Steel Corp., 1325 Carnegie Bldg., Pittsburgh, Zone 30, slacking and lime handling plant addn. $41,000.

Pa., Jeannette—FACTORY—Pennsylvania Rubber Co., P. C. Mathewson, vice pres. and mfg. mgr., Chambers Ave., plans by Fletcher Thompson, Inc., 211 State St., Bridgeport, Conn., and bids soon 1 story, 175 x 200 ft., brick, steel factory. CD 7/19—ENR 7/27.

Pa., McKees Rocks—PLANT—Continental Can Co., W. F. Lenhart, plant supt., Munson Ave., plans nearing completion and bids soon 1 story, steel, concrete block forging plant. $100,000.

Pa., McKeesport — FACTORY — Jones & Laughlin Steel Corp., 3 Ave. and Ross St., Pittsburgh, altering factory, Port Vue, near here. $61,580.

Pa., Phila.—PLANT—Samuel Bolder & Co., 826 Arch St., repairing mfg. plant.

Pa., Phila.—PLANT—Sterling Metalware Co., E. Liepman, mgr., 2536 N. Reese St., plans completed repairing mfg. bldg. $45,000.

Pa., Pittsburgh—FREIGHT TERMINAL—Lancaster Transportation Co., A. Yardis, Pittsburgh mgr., 804 Shore Ave., Pittsburgh, A. Robby, field mgr. and in charge, 701 E. Ross St., Lancaster, plans nearing completion by S. Barbalet, 727 Bakewell Bldg., and bids soon general contract 1 story, 140x150 ft., brick, concrete freight terminal. $40,000.

Pa., Titusville—FACTORY—Universal-Cyclops Steel Corp., Titusville, 1 story, brick, steel factory. $45,040.

Pa., Warren — SERVICE — Pennsylvania R. R., J. L. Gressitt, ch. engr., Broad St. Station Bldg., 1617 Pennsylvania Blvd., Phila., Zone 4, service bldg. $59,742.

Tex., Austin—PLANT—Steck Co., 217 W. 9 St., plans by C. H. Page & Son, Gracy Bldg., 7 story, 50x128 ft., rein.-con., steel printing plant addn.

Tex., Amarillo—WAREHOUSE—Furr Food Stores, Amarillo, soon lets contract 140x200 ft., rein.-con. cast stone, brick, warehouse, vault doors, etc. $50,000. J. Roy Smith, Blackburn Bldg., engr. CD 12/6—ENR 12/19.

Tex., Beaumont—PLANT—Jefferson Parking Co., Beaumont, reconstructing plant. $75,000.

Tex., Brownsville—FREEZING PLANT—Pan-American Freezers, c/o F. H. Floyd, Eagle Pass, soon lets contract (1st unit) 100x200 ft., quick-freezing plant, with 30x60 ft. bldg. for machinery, $150,000. CD 11/28—ENR 12/7.

Tex., Dallas—PLANT—Borden Co., 1801 Leonard St., plans by T. D. Broad, Burt Bldg., milk products plant addn. $40,000.

Tex., Decatur—GARAGE, etc.—Decatur Ice Co., Decatur, plans by P. M. Geren, 306½ Burnet St., Fort Worth, 2 story, brick, structural clay tile, concrete garage and warehouse. $43,000.

★**Tex., Houston**—GAS PLANT—Shell Oil Co., Inc., Shell Bldg., auxiliary gas plant for recovery of hydrocarbons, $1,000,000; addnl. water-cooling towers at refinery plant, $200,000; installing gas lines and oil and by-product lines at refinery plant, over $50,000; addnl. water sys. and lines at refinery plant and area, over $50,000, Deer Park.

Tex., Mercedes—PLANT—G. E. Watson, 115 Palm Beach St., soon lets contract 1 story, 110x150 ft. citrus and vegetable packing plant, brick, rein.-con. $75,000.

Tex., San Antonio—REPAIR SHOP—Kerrville Bus Co., Kerrville, soon lets contract 70x105 ft., structural tile, rein.-con. mechanical repair shop, etc. $45,000. Morris & Noonan, 802 Am. Hos. & Life Ins. Bldg., engrs.

Tex., San Antonio—SHOP, etc.—H. Pitts Electric Co., 3222 Morales St., soon lets contract electric shop and storage bldg. $40,000. H. P. Smith, Natl. Bank Comm. Bldg., archt.

Tex., Seguin—PLANT—W. M. Chambers & Associates, Seguin, frozen tamale mfg. plant, 5,000 doz. per 8 hour capacity. $40,000.

Tex., Sherman — PLANT — Frozen Food Locker, 222 W. Lamar St., expanding frozen food locker plant. $40,000.

INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

★**Wash., Bellingham — FACTORY, etc.** — Pacific Coast Paper Mills, Army and Chestnut Sts., 2 story, 95x145 ft. factory, 2 story, 100x240 ft. machinery and small sheet-iron bldg. to house boiler equip. $375,000.

Wis., Green Bay—FACTORY—Green Bay Clothing Mfg. Co., 1343 Main St., 1 story, 100x223 ft., brick, rein.-con., steel factory, concrete fdn. Feldhausen & Coughlen, Columbus Bldg., archts.

Wis., West Allis (br. Milwaukee)—FACTORY—Superior Steel Products, 2754 S. 19 St., Milwaukee, Zone 7, plans by F. S. Gurda, 733 W. Mitchell St., Milwaukee, Zone 7, factory. $50,000.

Wis., Wausau—WAREHOUSE—Pope Bros. Co., 105 Prospect St., plans by Oppenhamer & Obel, Wausau, 1 story, 60x340 ft. warehouse, 1 story, bamnt., 20x100 ft. office, rein.-con., brick, steel joist, concrete fdns.

Ont., Toronto — FACTORY — Canadian Steel Strapping Co. Ltd., 103 Bathurst St., factory. $40,000.

Ont., Toronto—WAREHOUSE—Canadian Tire Corp., 837-47 Yonge St., plans by J. A. Thatcher, 37 Cowan Ave., 5 story, brick, warehouse addn., concrete fdn. $200,000.

Ont., Walkerville — PLANT — Dominion Forge & Stamping Co. Ltd., 2480 Seminole St. personnel bldg. and die room. $106,000.

Que., Lachine (Montreal)—FACTORY—Steel Co. of Canada, Ltd., 525 Dominion St., Montreal, altering, exten. factory, installing equip. $75,000.

Que., Quebec City—FACTORY—Zephyr Looms & Textiles Ltd., 55 Huskisson St., Guelph, Ont., plans by H. R. Wiggs, 660 St. Catherine St. W. Montreal, spinning factory. $90,000. G. L. Wiggs & Co., 660 St. Catherine St., W. Montreal, engr.

Alta., Calgary—BOTTLING PLANT—Canada Dry Ginger Ale, Ltd., R. H. MacDonnell, mgr., 153 Sherbourne Ave., Toronto, Ont., bottling plant. $300,000.

Alta., Calgary — PLANT — Saskatchewan Horse Co-operative Marketing Assn., Regina, Sask., horse processing plant. $75,000.

Alta., Edmonton—PLANT—Brown Cleaners & Dyers, Ltd., 9915 109 St., 1 story, 100 x 160 ft., concrete, brick cleaning plant, 10019—105 St. $45,000.

Alta., Edmonton—PLANT—Swift Canadian Co. Ltd., 66 St., plant, installing equip. About $287,870.

B. C., Bralorne—DIAMOND DRILLING, etc. — Bridge River Consolidated Mines, Ltd., Bralorne, diamond drilling and general development, Bridge River Dist. $437,500. C. Rutherford, c/o owner, engr.

B. C., Nanaimo—PLANT—Beban Logging Co., Ltd., 16 Commercial St., logging plant, sawmill, etc. $40,000.

B. C., Vancouver—PLANT—Chief Brand Oils Ltd., 751 Grenville St., chemical mfg. plant. $40,000.

North West Territory, Yellowknife—DIAMOND DRILLING, etc.—Homer Yellowknife Ltd., Yellowknife, surface exploration and diamond drilling. $125,000. General Engineering Co., 100 W. Adelaide St., Toronto, Ont., engrs.

N. S., Halifax—BOTTLING PLANT—Canada Dry Ginger Ale Ltd., R. H. MacDonnell, mgr., 153 Shelbourne Ave., Toronto, Ont., bottling plant. About $350,000.

N. S., Halifax—PLANING MILL, etc.—MacCulloch & Co. Ltd., Dutch River Rd., planing mill, sash and door factory. $100,000.

N. S., Trenton—PLANT—Eastern Car Co., Ltd., c/o W. F. Knoll, mgr., plant imprv. program. $50,000.

Ont., Bedford—DIAMOND DRILLING, etc.—Ontario Phosphate Industries, Ltd., Bedford, developing phosphate deposits and essential structures, diamond drilling to be continued. $75,000.

Ont., Hamilton — PLANT — Canada Dry Ginger Ale, Ltd., R. H. MacDonnell, mgr., 153 Sherbourne Ave., bottling plant, Carling Ave. $150,000.

Ont., Kitchener—PLANT—Dominion Rubber Co., Ltd., 145 Strange St., plans by Margison & Babcock, 137 Wellington St. W., Toronto, and owners staff, J. Martin, genl. mgr., 137x187 ft. brick plant addn. $100,000.

Ont., Leaside (Postal Dist. Toronto)—PLANT—Mono Co., Ltd., 14 Commercial Rd., plant. $50,000.

Ont., London—BOTTLING PLANT—Canada Dry Ginger Ale Ltd., R. H. MacDonnell, mgr., 153 Sherbourne Ave., Toronto, bottling plant. About $200,000.

Ont., London—FACTORY—Scott & McHale, Ltd., Richmond St., plans by L. G. Bridgman, Royal Bank Bldg., shoe factory. $100,000.

Ont., Ottawa—BOTTLING PLANT—Canada Dry Ginger Ale Ltd., R. H. MacDonnell, mgr., 153 Sherbourne Ave., Toronto, bottling plant. $450,000.

Ont., Red Lake—DIAMOND DRILLING, etc.—Headway Red Lake Gold Mines Ltd., 67 Yonge St., Toronto, developing 9 claims in Heyson Twp., Red Lake area, incl. diamond drilling, etc. $100,000.

Ont., Toronto—PLANT—Calmont Oils Ltd., c/o Allied Industrials Ltd., 108 River St., coal mining development, essential structures, Alberta Coal area. $100,000 available.

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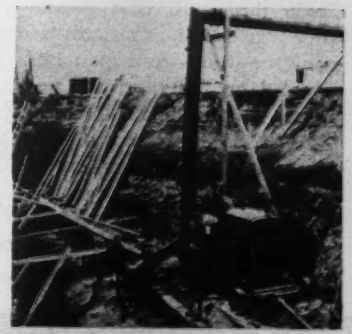

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Ont., Toronto—PLANT—Davenport Tool & Die Works, 1874 Davenport Rd., plans by C. W. Smith, 602 Jane St., 1 story, 35 x 73 ft. and 1 story, 10 x 65 ft., concrete plant extens. $40,000.

Ont., Toronto—PLANT—Oxford Truck & Body Works, Ltd., c/o F. W. Fisher, 320 Bay St., motor bodies, etc. mfg. plant. $40,000.

Ont., Toronto—FACTORY—Super Health Aluminum Co., Ltd., 107 McGill St., plans by E. I. Richmond, 455 Spadina Ave., 70 x 130 ft., concrete factory. $40,000.

Ont., Toronto—PLANT—Toronto Refiners & Smelters, Ltd., c/o H. M. Goodman, 347 Bay St., smelting, refining and milling plant. $40,000.

Ont., Windsor—PLANT—Escuminac Peat Co. Ltd., c/o B. A. Maleyko, K.C., Windsor, plant. $50,000.

Ont., Woodstock—PLANT—John Petrik Co., Woodstock, art porcelain, etc. mfg. plant. $40,000.

P. E. I., Charlottetown—WAREHOUSE, etc.—F. B. Clarke, Prince St., potato warehouse and plant, cold storage plant. $40,000.

Que., Cap Route (Postal Dist. Quebec City)—PLANT—Hardware & Woodenwear, Inc., c/o P. Gauvin, Cap Rouge, ice cream freezers, ice crushers, dairy supplies, etc. mfg. plant. $45,000.

Que., Montreal—PLANT—Kay-Cee Toggery Ltd., c/o B. S. Mergler, 261 St. James St. W., wool and cotton fabrics, etc. mfg. plant. $45,000.

Que., Montreal—PLANT—Natural Products Corp., c/o G. H. Semple, 204 Notre Dame St., chemical derivatives of land products mfg. and refining plant. $40,000.

Que., Noranda—MACHINE SHOP, etc.—De Morest Drilling, Ltd., 9 Ave. and 4 St., 2 story machine shop, garage, and office. $45,000.

BIDS ASKED

Calif., Burbank—FACTORY—General Controls Co., 1320 S. Flower St., 80x300 ft., rein.-con., steel frame factory bldg., rein.-con. vault. $45,000. Harnish Co., 3305 Wilshire Blvd., Los Angeles, engrs.

Conn., Norwalk—FACTORY—R. T. Vanderbilt, Inc., 33 Winfield St., 3 story, 35x80 ft., rein.-con., brick factory addn. $40,000. Bids Dec. 11, rejected. H. T. Lindberg, 5 E. 57 St., New York, N. Y., archt. CD 12/1—ENR 12/7.

Tex., Houston—WAREHOUSE—S. Myers, Inc., 800 Lockwood Dr., 1 story, 103x190 ft., steel frame, mono concrete warehouse addn. $75,000. Finger & Rustay, 710 Natl. Standard Bldg., archts. CD 12/19—ENR 12/21.

Tex., Trenton—LOCKER PLANT—Trenton Refrigerating Co-operative, Trenton, locker plant. $40,000.

Ont., Toronto—LAUNDRY—B. Swartz, archt., 139 Queen St. W., rebuilding laundry for Sanitary Laundry Co., 9 Bulwar St. About $45,000.

LOW BIDDERS

Tex., Houston—WAREHOUSE, etc.—Wilson Electric Equipment Co., 111 N. Sampson St., 1 story, steel frame, hollow tile, concrete, etc. warehouse, storage, from T. D. Howe Constr. Co., 3210 White Oak Dr., $87,339. L. Q. Cato, 2111 Gray Ave., archt.

CONTRACTS AWARDED

Calif., Los Angeles—STORAGE SHED, etc.—Twentieth Century Constr. Co., 696 Moulton Ave., 110x230 ft., brick, steel frame equipment and storage shed. Owner builds. $50,000. MacIntosh & MacIntosh, 306 N. Vernon Ave., engrs.

★ **Calif., San Diego**—PLANT—Ryan Aeronautical Co., 2701 Harbor Dr., superstructure for assembly bldg., heating and ventilating sys. and yard paving, Harbor Dr., to Trepte Constr. Co., 2001 Kettner Blvd., approx. $700,000. CD 11/15—ENR 11/23.

Conn., New Haven — FACTORY — New Haven Pulp & Board Co., 259 East St., altering, constructing addnl. factory units, to Dwight Bldg. Co., 152 Temple St., Est. $40,000. Westcott & Mapes, Inc., 139 Orange St., archts. F. L. Smith, 21 E. 40 St., New York, N. Y., engr.

Conn., New Haven—FACTORY—National Folding Box Co., James and Alton Sts., altering, exten. factory, incl. water tank, enclosure for 30 x 200 ft. platform, to E. & F. Constr. Co., 94 Wells St., Bridgeport. Est. $40,000. Fletcher Thompson, Inc., 211 State St., Bridgeport, engrs.

Ga., Athens—PLANT, etc.—Athens Co-Operative Creamery, Athens, 1 and 2 story, 77 x 100 ft. milk condensing plant and dairy, to H. Nicholson, Athens. $40,000.

Ia., Sioux City—PLANT—Cudahy Packing Co., 221 N. La Salle St., Chicago, Ill., 28x64x 230 ft. icing bldg. at meat packing plant to Mainelli Const. Co., 33 and O Sts., Omaha, Neb., approx. $40,000.

Md., Baltimore—WAREHOUSE—Crosse & Blackwell, 6801 Eastern Ave., 2 story, rein.-con. storage warehouse, to Consolidated Engineering Co., 20 E. Franklin St., $100,000. L. R. White, Jr., 10 W. Chase St., archt.

Md., Baltimore—WAREHOUSE, etc.—Milcor Steel Co., S. 41 and W. Burnham Sts., Milwaukee, Wis., 2 story, part bsmnt., 160 x 240 ft. warehouse and office bldg., concrete fdns., to Morrow Bros., Inc., 2310 N. Charles St., $266,850. J. R. Edmunds, Jr., and H. G. Hall, 409 Calvert Bldg., archts.

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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Mich., Detroit—FOUNDRY—Atlas Foundry Co., 131 S. Livernois Ave., brick, steel, concrete foundry addn., to W. F. Demske, 433 Majestic Bldg. Est. $40,000.

Mich., Detroit — PLANT — Detroit Diesel Engine Div. of General Motors Corp., 13400 W. Outer Dr., brick, steel, rein.-con. diesel engine factory addn., to Darin & Armstrong, 2041 Fenkell Ave. Est. $75,000.

Mich., Detroit — WAREHOUSE — Motor Products Corp., 11801 Mack Ave., 1 story concrete, brick, steel warehouse, to A. A. Albrecht Co., 1304 Penobscot Bldg. Est. $50,000.

★**Minn., Brainerd** — REPAIR SHOPS — Northern Pacific Ry. Co., E. Blum, ch. engr., 176 E. 5 St., St. Paul, piling, grading, tracks, foundations for freight car repair shops, to A. Johnson Constr. Co., 608 Foshay Tower, Minneapolis. Est. $1,500,000. Toltz, King & Day, 1509 Pioneer Bldg., St. Paul, engrs. and archts. CD 11/22—ENR 11/30.

Mich., Ferndale — MACHINE PLANT — DeVlieg Machine Co., 450 Fair Ave., 2 brick, steel, concrete machine plant addns., to H. E. Rudy Co., 4151 Oakman Blvd., Detroit. Est. $50,000.

N. J., Hillside—SHOP—H. Breen Iron Works, Inc., 1450 Chestnut St., 1 story, 61x250 ft., steel shop, to D. & G. Const. Co., 178 Goodwin Ave., Newark, $45,000. CD 12/1—ENR 12/7.

N. J., Union—FACTORY—Schering Corp., Morris Ave., 1 and 2 story, 60x200 ft. pharmaceutical products mfg. plant, to Car Vater Co., 519 Main St., East Orange, $45,000.

O., Cleveland — FACTORY — Clark Controller Co., C. W. Wendt, secy.-treas., 1146 E. 152 St., 1 story, 120 x 220 ft., brick, steel, glass block factory, to J. L. Hunting Co., 9 and Chester Bldg. Est. $164,741. W. H. Hatch, Hippodrome Annex Bldg., engr.-archt.

Pa., Lemoyne—LOCKER—Lemoyne Ice Co., food locker bldg., cement, concrete, to H. A. Zimmerman, 51 Fort St., $40,000.

★**Pa., Neville Island (br. Pittsburgh)**—PLANT—Pittsburgh Coke & Chemical Co., G. E. Digman, genl. mgr., Grant Bldg., Pittsburgh, general contract, 6 one story, brick, steel frame chemical plant bldgs., to Lummus Co., 420 Lexington Ave., New York, N. Y. Est. $1,000,000. CD 10/31—ENR 11/2.

Pa., Phila.—GRAIN ELEVATOR—Tidewater Mill & Elevator Co., P. Hawkins, supt., 2040 Market St., repairing grain elevator, wood, corrugated iron, to A. Raymond Raff Co., 1435 W. Thompson St., $150,000. CD 12/22—ENR 12/28.

Tenn., Clarksville—PLANT—B. F. Goodrich Co., C. R. Spencer, plant mgr., Clarksville, and J. A. Scott, 500 S. Main St., Akron, O., mfg. plant addns., to Hughes Foulkrod Co., Schaff Bldg., Phila., Pa., $200,000. Awarded 12/26. CD 11/10—ENR 11/16.

Tex., Dallas—SHOP—Griffin Tank & Welding Service, 3027 Elm St., brick, concrete shop, to R. J. Dillon, 111 Walters Dr., $40,000. CD 12/19—ENR 12/21.

Tex., Edinburg—PLANT—Lone Star Fruit Co., Edinburg, 1 and 2 story, citrus packing plant unit, concrete, metal, etc., day labor. $40,000. CD 12/6—ENR 12/14.

Wis., Fort Atkinson—FACTORY—Moe Bros. Mfg. Co., 700 Oak St., 17,000 ft. concrete, brick factory addn., to T. S. Willis, 216 Hayes Bldg., Janesville. Grossold & Johnson, 784 N. Jefferson St., Milwaukee, Zone 2, archts.

Tex., Fort Worth—PLANT CAFETERIA—Austin Co., engr.-archts., Clifford Ave., cafeteria for Consolidated-Vultee Aircraft Corp., Grants Lane, to J. W. Bateson Co., Irwin-Keasler Bldg., Dallas, $175,980. Est. $150,000. CD 12/7—ENR 12/14.

Tex., Mission — PLANT — Mission Food Products Co., Mission, vegetable, citrus and meat processing plant, force account. $40,000. CD 12/12—ENR 12/14.

Tex., Weslaco—PLANT—American Fruit Growers, Inc., Weslaco, 1 and 2 story citrus and vegetable packing plant, force account. $41,000. CD 12/12—ENR 12/14.

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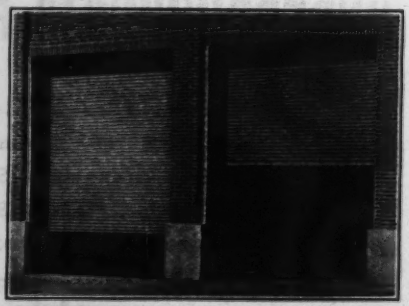

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PROPOSED WORK

†**Kan., Topeka**—HANGAR—U. S. Eng. 10 E. 17 St., **Kansas City, Mo.** hangar, oil storage bldg., widening taxiways, at Army Airbase.

Mass., East Boston (sta. Boston)—AIRPORT TERMINAL — Commonwealth of Massachusetts, Dpt. P. Wks., Div. Waterways, 100 **Nashua St., Boston**, plans by Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., Boston, terminal bldg. at Logan Airport. CD 7/20—ENR 7/27.

Nebraska—TRANSMISSION LINES—Highline Electric Assn., Main and Denver Sts. Holyoke, 118 mi. transmission lines, Red Willow, Hitchcock and Hayes Counties. $100,000.

N. J., Bergenfield—SKATING RINK—Owner, c/o H. Lucht, archt., 1700 Teaneck Rd., West Englewood. 125x175 ft., frame, concrete roller skating ring, S. Washington Ave. $40,000.

†**N. M., Clovis**—AIRFIELD BLDGS.—U. S. Eng., Commercial Bldg., Albuquerque, addnl airfield bldgs. $150,000.

N. Y., New York—PIER REPAIRS—Dpt. Marine & Aviation, Pier A, North River, Zone 4, bids soon repairing Pier 31. $50,000.

Oklahoma — TRANSMISSION LINES — Choctaw Electric Cooperative, Hugo, rural electric power transmission lines, Choctaw Co. $100,000. C. H. Guernsey & Co., 600 Petroleum Bldg., Oklahoma City, engrs.

Pennsylvania—RURAL ELECTRIC LINES—Warren Rural Electric Co-Operative Assoc., H. F. Curry, supt., Youngsville, making plans 180 mi. rural electric lines, near Warren, Warren Co. $205,000. Gibbs & Hill, Pennsylvania R. R. Sta., New York, N. Y., engrs.

Texas — TRANSMISSION LINES — Sierra Electric Cooperative, Hillsboro, 90 mi. rural electric power transmission lines, Hill Co. $100,000.

Texas — TRANSMISSION LINES — Southwest Texas Electric Cooperative, Inc., Eldorado, 220 mi. rural electric power transmission lines, Schleicher Co. $150,000. REA allot.

Texas — TRANSMISSION LINES — Upshur Electric Cooperative Corp., Gilmer, soon lets contract constructing 50 mi. electric transmission lines, Upshur Co. $25,000. CD 1/31—ENR 2/3.

†**Tex., Aransas Pass**—United Carbon Co., United Carbon Bldg., Charleston, W. Va., and Aransas Pass, pipelines in vicinity of here. $220,000. Defense Plant Corp. will finance.

†**Tex., Childress** — BOMBING TRAINER BLDG.—U. S. Eng., 221 W. Main St., Denison, bombing trainer bldg., Serial No. 41-242-63-89. $50,000.

†**Tex., Harlingen**—GUNNERY RANGE—U. S. Eng., 25 St. and Avenue F, Galveston, plans air-to-ground gunnery range. Over $25,000.

Tex., Houston—DOCKS—American Liberty Pipe Line Co., Galena Park, replacing docks. $75,000.

★**Tex., San Antonio** — ELECTRIC HIGHLINES, etc.—City Public Service Bd., N. St. Marys St., electric highlines, $100,000 appropriated; underground cable electric distr. lines, $100,000 appropriated; street lighting $80,000 appropriated; exten. outside electric poles and lines in residential districts, $100,000 appropriated; new sub-stations for electric plant facilities, $125,000; natural gas mains, $115,000 appropriated.

Washington—POWER LINE—Washington Water Power Co., W. 825 Trent St., Spokane, 50 mi. power line from Colville to Metaline Falls. $25,000.

N. B., Saint John—LOADING TOWERS—Dominion Coal Co. Ltd., North Wharf, loading towers. $25,000.

Ont., St. Thomas—GRAND STAND, etc.—Elgin Horse Breeders Assn., c/o R. Inch, 7 Union Rd., Southwold, grandstand, etc. $40,000.

BIDS ASKED

Bids Asked After January 10

★†**Kan., Topeka**—HANGAR, etc.—U. S. Eng., 10 E. 17 St., Kansas City, Mo., airbase imprvs., incl. hangar, oil storage bldg., widening taxiways, etc. $628,510.

Bids Asked January 17

B. C., Abbotsford — AERODROME — Secy. Dpt. Transport, Ottawa, Ont., addnl. aerodrome development, incl. concrete taxi strips, parking areas. $45,000. Plans deposit $10.

Bids Asked January 18

Missouri — RURAL ELECTRIC LINES — Genevieve Electric Cooperative, Inc., T. A. Carron, pres., Ste. Genevieve, 162.3 mi. rural electric distr. lines in 2 separate systems, with a one transformer substation for each sys. in Perry and St. Genevieve Counties. Plans deposit $5. Michael Drazen and Associates, 4903 Delmar Blvd., St. Louis, Zone 8, engrs. Owner also plans 75 mi. extensions as soon as approvals are granted. CD 11/27—ENR 11/30.

UNCLASSIFIED (Bids Asked, Cont'd.)

Bids Asked January 22

La., Algiers—WHARF—J. S. Smith, Jr., vice pres. Todd-Johnson Dry Docks, Inc., Hinds Lane Wharf, New Orleans, and Algiers, rein.-con. deck wharf on steel piles, gangway track altering present wharves, dredging ship berth and basin for floating drydock. Frederick Harris, Inc., 27 Williams St., New York, N. Y., engrs.

†**Mass., Fort Devens**—FENCING—U. S. Eng., 31 St. James Ave., Boston, fencing, clearing, No. 19-023-45-NEG 74, $50,000.

†**Tex., Aransas Pass** — PIPELINES — United Carbon Co., United Carbon Bldg., Charleston, W. Va., and Aransas Pass, pipelines in vicinity of Aransas Pass. $226,000. Defense Plant Corp. will finance. CD 1/3—ENR 1/11.

LOW BIDDERS

†**Calif., San Bernardino** — SPRINKLER SYSTEM—U. S. Eng., 751 Figueroa St., Los Angeles, Zone 14, Jan. 2, installing automatic sprinkler sys. in 15 bldgs., Air Depot No. 92, from Barnard Engineering Co., 736 S. Washington Blvd., Los Angeles, **$189,463.**

†**Calif., San Pedro**—DRYDOCK, etc.—Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Dec. 27, 18,000 ton drydock and constructing addnl. berthing facilities at owner's plant, Nos—1708, from Morrison-Knudsen Co., 411 W. 5 St., Los Angeles, **$168,800.** Federally financed.

★†**Ga., Chatham (br. Savannah)**—HANGARS, etc.—U. S. Eng., Post Office Bldg., Savannah, Jan. 3, grading, paving, drainage, constructing apron, etc., from Wm. F. Dowe & Co., Augusta, **$515,000.** CD 11/9—ENR 11/16.

†**N. M., Roswell**—AIRPORT RUNWAYS, etc.—U. S. Eng., Albuquerque, runways, etc. at airfield, from Standard Paving Co., 2119 E. 11 St., Tulsa, Okla., approx. **$480,000.** CD 11/13—ENR 11/16.

CONTRACTS AWARDED

†**Ala., Anniston**—LOADING DOCKS, etc.—U. S. Eng., Grant St., west of Westwood St., Mobile, miscellaneous construction. Anniston Ordnance Plant, incl. loading docks, grading, drainage, paving, railroad spur, lighting sys., to Royce Kershaw & Co., Bell Bldg., Montgomery, **$108,000.** Bids 12/22.

†**Ala., Gadsden**—AIRFIELD BLDG.—U. S. Eng., Grant St., west of Westwood St., Mobile, installing heating for warehouse, to Sullivan, Long & Hagerty, 2014 2 Ave. N., Bessemer, **$108,772.**

†**Ariz., Tucson** — AIRFIELD BLDGS. — U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., paint, oil and dope bldg. and move bldgs. at Davis-Monthan Army Airfield, No. 18, to Bailey & McCoy, 1130 Lowell Ave., **$24,685.** CD 11/8—ENR 11/9.

†**California**—GAS PIPELINE—Southern Calif. Gas Co., 810 S. Flower St., Los Angeles, installing butadiene gas pipeline from Los Angeles to Dow Chemical Co. at 190 St. and Vernon Ave., Los Angeles, involving 17 mi. 8 in. and 12 mi. 4 in. pipe, to W. A. Bechtel Co. 5848 Mira Monte Blvd., Los Angeles, over **$25,000.** Defense Plant Corp. will finance.

Calif., Reedley—STONE BALLAST PRODUCTION—Atchison, Topeka & Santa Fe Ry. Co., M. C. Blanchard, ch. engr. (Coast Lines), 560 S. Main St., Los Angeles, producing approx. 100,000 cu. yd. crushed stone ballast, near here, for use in rehabilitating tracks near Fresno, to Sharp & Fellows Contg. Co., 108 W. 6 St., Los Angeles, over **$25,000.**

★†**Calif., San Diego**—SHOULDER STABILIZATION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., shoulder stabilization, Naval Air Station, Spec. 15475, NOY 11136, to R. E. Hazard & Sons, 2545 Kettner Blvd., San Diego, and Clyde W. Wood, Inc., 816 W. 5 St., Los Angeles, **$1,038,670.** Bids 12/12, CD 12/15.

†**Calif., San Francisco**—AIRPORT WORK—U. S. Eng., 74 New Montgomery St., constructing rock face along runway fill, Contr. W-04-203-eng-1565, San Francisco Municipal Airport, to P. Sorensen, Redwood City, Calif., est. **$63,000.**

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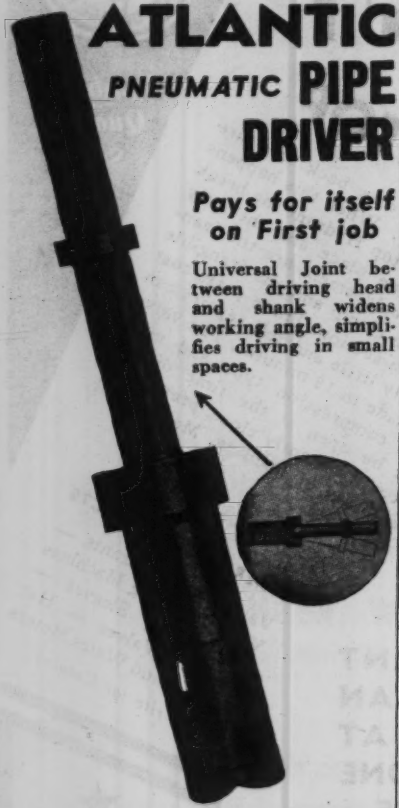

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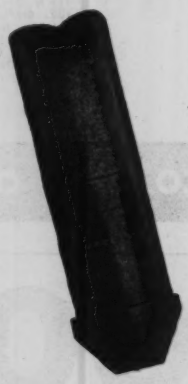

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Unclassified (Contracts Awarded Cont'd.)

†**Colo., Denver**—SWIMMING POOL—U. S. Eng., 909 17 St., Denver, swimming pool, Fitzsimmons General Hospital, Contr. W-41-016-eng-0274, to **Mead & Mount Constr. Co.**, Denver Natl. Bank Bldg., Denver, $100,000; bldg., Contr. W-05-066-eng-231, to N. R. Nielsen & Son, 632 Detroit St., Denver, Colo., $50,222.

†**Fla., Fort Myers**—RANGE FACILITIES—U. S. Eng., Post Office Bldg., Savannah, Ga., range facilities, Buckingham Army Airfield, Contr. W-09-133-eng-512, to Moody Bros., Fort Myers, approx. $54,177.

★†**Fla., MacDill Field (br. Tampa)**—RUNWAYS, etc.—U. S. Eng., Post Office Bldg., Savannah, Ga., runways, parkways, to W. L. Cobb Constr. Co., 1102 23 St., Tampa, $613,774. Bids 12/12. CD 12/23—ENR 12/28, under LB.

Iowa — TRANSMISSION LINES — Linn County Rural Elec. Co.-Op., Assn., Marion, 92 mi. transmission lines, Linn Co., to Jacobs & Doyle Const. Co., Edgewood, $38,421. CD 3/10—ENR 3/23.

†**Kan., Hutchison**—AIR STATION BLDG.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., structure to house flight trainers, Naval Air Station, NOY 10693, to Dondlinger & Son Constr. Co., Box 2033, Wichita, $67,160.

★**Montana**—OIL PIPELNE—Home Oil & Refining Co., north of Great Falls, 90 mi. 5 in. underground oil pipeline from Cut Bank to Great Falls, to McLaughlin, Inc., Ford Bldg. and Utility Builders, 421 1 Ave. N., Great Falls. Est. $500,000. CD 11/30—ENR 12/7.

†**N. J., Fort Dix**—SIGNALLING SYSTEM—U. S. Eng., 120 Wall St., New York 5, N. Y., nurses signalling sys., to Emerson Garden Elec. Co., Inc., 38 W. Scott Pl., Elizabeth, $32,865.

†**N. M., Alamogordo**—TAXIWAY—U. S. Eng., Albuquerque, taxiway and warm-up pads, Contr. W-29-005-eng-293, Alamogordo Army Airfield, to Henry Thygesen & Co., Albuquerque, $123,672.

†**N. M., Clovis**—AIRFIELD—U. S. Eng., Albuquerque, addnl. airfield construction, Contr. W-29-005-eng-293, Clovis Army Airfield, to J. D. Leftwich Constr. Co., Lubbock, Tex., est. $54,625.

†**N. M., Kirtland Field (br. Albuquerque)**—AIRFIELD EXTENSIONS— U. S. Eng., 4 and Gold Sts., Albuquerque, exten. apron, hangar, turnouts, etc., to M. M. Sundt Const. Co., Albuquerque, $145,610. CD 11/21—ENR 11/30.

†**N. Y., Utica** — SIGNALLING SYSTEM—U. S. Eng., 120 Wall St., New York, Zone 5, nurses signalling sys., to Langdon & Hughes Const. Co., Inc., 246 Elizabeth St. $25,134.

Oklahoma—OIL PIPELINES—Shell Pipe Line Corp., Cushing, reconditioning 2 parallel 52 mi. 6in. crude oil pipelines between Cushing and Tonkawa, to Smith Contg. Co., Cushing, $70,000. CD 7/21.

†**Okla., McAlester** — TRACKS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., connecting and passing tracks, Naval Ammunition Depot, NOY 10980, to Brown & Root, Inc., 4300 Calhoun Rd., and W. S. Bellows Constr. Co., 716 N. Everton St., Houston, Tex., $139,000.

†**R. I., Westerly** — AIRPORT WORK—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., addnl. work, airport, Spec. 15736, NOY 11424, to M. A. Gammino Constr. Co., 728 Valley St., Providence, $141,780. Awarded 1/2. CD 12/22.

Tex., Andrews—OIL PIPELINE—Humble Pipeline Co., Humble Bldg., Houston, 4 in. connecting crude oil pipeline. Purchase and hire. $40,000. CD 12/14—ENR 12/21.

†**Tex., Camp Hulen** — FENCING — U. S. Eng., 25 St. and Avenue F, Galveston, 19,200 lin. ft. 10 ft. chain-link perimeter fencing, gates, etc. for Prisoner of War Camp, to Burnham Constr. Co., Georgetown, $40,881. Est. $40,000. CD 12/1—ENR 12/7, under Public.

†**Tex., Pyote**—AIRFIELD BLDGS.—U. S. Eng., Albuquerque, N. M., school bldgs., Pyote Army Airfield, Contr. W-29-005-eng-283, to Ponsford Bros., 914 E. Missouri St., El Paso, est. $62,081.

Tex., San Antonio—HANGAR—R. E. Culver, P. O. Box 5128, hangar, force account. $40,000.

Tex., San Antonio—PLAYGROUND, etc.—San Antonio Boy's Club, S. Hackberry St. and Highland Park Lyons Club, playgreund and recreation center, grounds development, drainage, grading, swimming pool, force account. $60,000.

†**Tex., Texarkana**—CAR PARKING LOT—U. S. Eng., 231 W. Main St., Denison, car parking lot, ordnance center, force account. $25,000.

†**Va., Norfolk** — BACK-UP FACILITIES CONVOY ESCORT PIER—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., back-up facilities convoy escort pier, Spec. 15073, NOY 10431, to Barrett & Hilp, Dixie Ave., $54,338. Bids 12/7. CD 11/1.

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Postwar Projects see p. 184